

SOIL SURVEY

Fulton County Kentucky



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
KENTUCKY AGRICULTURAL EXPERIMENT STATION

HOW TO USE THE SOIL SURVEY REPORT

THIS SURVEY of Fulton County will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; aid foresters in managing woodland; help county officials in planning future developments; serve as a reference for students and teachers; and add to our knowledge of soil science.

Locating Soils

Use the index to map sheets at the back of this report to locate areas on the large map. The index is a small map of the county that shows the location of each sheet of the detailed soil map. When the correct sheet of the large map has been found, it will be seen that boundaries of the soils are outlined, and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they occur on the map. The symbol is inside the area if there is enough room; otherwise, it is outside the area and a pointer shows where the symbol belongs.

Finding Information

This report contains sections that will interest different groups of readers, as well as some sections that may be of interest to all.

Farmers and those who work with farmers can learn about the soils in the section "Descriptions of the Soils" and then turn to the section "Use of the Soils for Agriculture." In this way, they first identify the soils on their farm and then learn how these soils can be managed and what yields can be expected. The "Guide to Mapping Units" at the back of the report will simplify use of the map and report. This guide lists each soil and land type mapped

in the county, and the page where each is described. It also lists, for each soil and land type, the capability unit and woodland suitability group, and the page where each of these is described.

Foresters and others interested in woodland can refer to the section "Use of the Soils for Woodland." In that section the soils in the county are grouped according to their suitability for trees, and factors affecting the management of woodland are explained.

Wildlife managers, naturalists, and sportsmen will want to refer to the section "Use of the Soils for Wildlife" for information regarding the kinds of wildlife found in the county, and the extent to which the various soils are suited to wildlife production.

Engineers and builders will find in the section "Engineering Properties of the Soils" tables listing characteristics of the soils that affect engineering.

Scientists and others who are interested will find information about how the soils were formed and how they were classified in the section "Formation, Morphology, and Classification of the Soils."

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending on their particular interest.

Newcomers in Fulton County will be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "Additional Facts About the County."

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Fieldwork for this survey was completed in 1961. Unless otherwise indicated, all statements in the report refer to conditions in the county at that time. The soil survey of Fulton County was made as part of the technical assistance furnished by the Soil Conservation Service to the Fulton County Soil Conservation District.

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SOIL SURVEY OF FULTON COUNTY, KENTUCKY

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FULTON COUNTY is in the southwestern corner of Kentucky (fig. 1). It is bordered on the south by Tennessee, on the east and north by Hickman County, and on the west by the Mississippi River. A part of the coun-

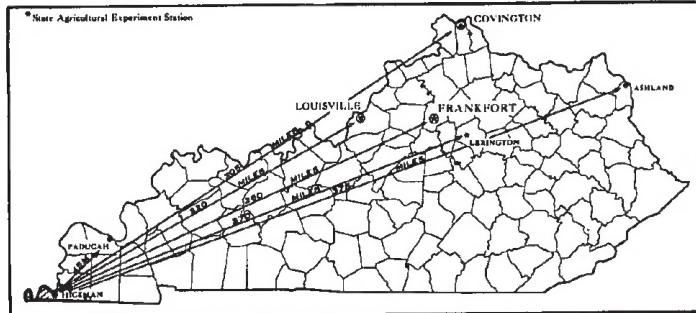


Figure 1.—Location of Fulton County in Kentucky.

ty is detached by the Mississippi River and lies west of the main body of the county. Island No. 8 and a smaller island north of the detached area are also a part of the county. About half of the county lies on the flood plain of the Mississippi River. The other half is made up of deep, loessial soils of the uplands. The flood plain west of Hickman is protected from flooding by a constructed levee that starts at Hickman and runs along the river into Tennessee. This levee protects about 23,000 acres in Fulton County. A levee that starts in Tennessee extends up the east side of the detached part of the county and prevents floodwater from sweeping across this area. The area, however, is not protected against floods because there is no levee on the west side.

The main body of the county is 30 miles from east to west and, on the average, about 7 miles from north to south. The total land area is 131,200 acres. Hickman, the county seat, is located on the bank of the Mississippi River near the center of the county.

How Soils Are Named, Mapped, and Classified

Soil scientists made this survey to learn what kinds of soils are in Fulton County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and

speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug or bored many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down to the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to uniform procedures. To use this report efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, the major horizons of all the soils of one series are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Commerce and Memphis, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in natural characteristics.

Many soil series contain soils that differ in the texture of their surface layer. According to such differences, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Commerce silt loam and Commerce silty clay loam are two soil types in the Commerce series. The difference in the texture of their surface layer is apparent from their names.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into soil phases. The name of a soil phase indicates a feature that affects management. For example, Memphis silt loam, 2 to 6 percent slopes, is one of several phases of Memphis silt loam, a soil type that ranges from nearly level to steep.

After a fairly detailed guide for classifying and naming the soils had been worked out, the soil scientists drew soil boundaries on aerial photographs. These photographs show woodland, buildings, field borders, trees, and other details that greatly help in drawing boundaries accurately. The soil map in the back of this report was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly

equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed or occur in such small individual tracts, that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major soil series in it, for example, Waverly-Falaya silt loams. Also, in most mapping, there are areas to be shown that are so swampy or so frequently worked by water that they cannot be called soils. These areas are shown on the soil map but they are given descriptive names, such as Gullied land, Riverwash, or Swamp, and are called land types rather than soils.

Only part of the soil survey was done when the soil scientists had named and described the soil series and mapping units, and had shown the location of the mapping units on the soil map. They still had to present the mass of recorded information in different ways for different groups of users, among them farmers, managers of woodland, and engineers. To do this efficiently, they had to consult with persons in other fields of work and with them prepare groupings that would be of practical value to the different users. Such groupings are the capability classes, subclasses, and units, designed primarily for those interested in producing the short-lived crops and tame pasture; woodland suitability groups, for those who manage wooded tracts; wildlife productivity groups for those interested in improving and controlling wildlife; and the classifications used by engineers who build highways or structures to conserve soil and water.

General Soil Map

After studying the soils in a locality and the way they are arranged, it is possible to make a general map that shows several main patterns of soils, called soil associations. Such a map is the colored general soil map in the back of this report. Each association, as a rule, contains a few major soils and several minor soils, in a pattern that is characteristic although not strictly uniform.

The soils within any one association are likely to differ from each other in some or in many properties; for example, slope, depth, stoniness, or natural drainage. Thus, the general soil map shows, not the kind of soil at any particular place, but patterns of soils, in each of which there are several different kinds of soil.

Each soil association is named for the major soil series in it, but, as already noted, soils of other series may also be present. The major soils of one soil association may also be present in another association, but in a different pattern.

The general map showing patterns of soils is useful to people who want a general idea of the soils, who want to compare different parts of a county, or who want to know the possible location of good-sized areas suitable for a certain kind of farming or other land use.

There are seven soil associations in Fulton County. These are shown on the general soil map in the back of this report and are described in the pages that follow.

1. **Commerce-Robinsonville association:** *Nearly level, somewhat poorly drained to well-drained soils on the Mississippi River flood plain*

The areas of this soil association are near the river and together cover about 26 percent of the county. The dominant soils are the Commerce and Robinsonville (fig. 2).

Commerce soils are moderately well drained to somewhat poorly drained and are generally near the riverbank. Their surface layer is dark grayish-brown silt loam or silty clay loam; it overlies mottled grayish-brown silt loam or silty clay loam. Commerce soils make up approximately 45 percent of this association.

Robinsonville soils are well drained to moderately well drained and in most places are near or adjacent to the riverbank. Their upper layers are dark grayish-brown silt loam, fine sandy loam, or silty clay loam. At a depth of 24 inches, these layers are underlain by brown fine sandy loam. Robinsonville soils make up about 33 percent of this association.

One of the minor soils in this association is Crevasse loamy fine sand. It is on natural levees adjacent to the riverbank, and it occupies about 10 percent of this soil association. Other minor soils are the Beulah, Bosket, Dubbs, and Dundee, all of which are on old natural levees that border former channels of the river, and which collectively make up about 6 percent of this soil association.

Fairly extensive sand and gravel bars make up another 6 percent of the association. These occur below the riverbank and extend into the river. Some of the material in these bars is useful in construction.

Most of this soil association is in capability classes I and II and is cropped continuously. Cotton, corn, soybeans, and alfalfa are the principal crops grown. Nearly all the farms within this association are large, and large acreages on a farm receive the same management.

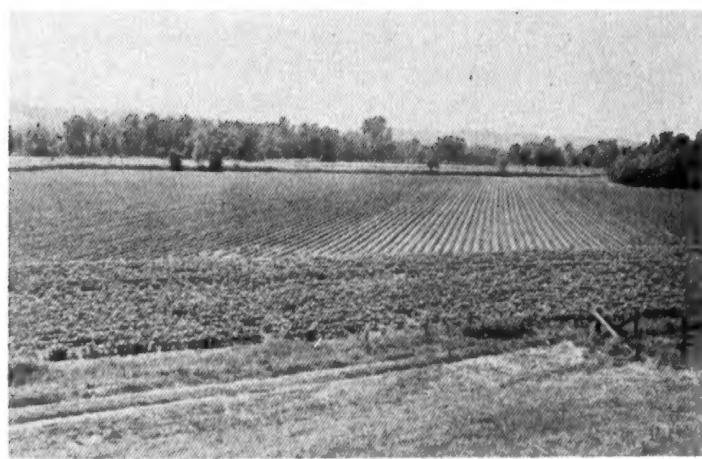


Figure 2.—View of Mississippi River flood plain showing cotton on well-drained Robinsonville soils in foreground and soybeans on less well-drained Commerce soils in background. Grassed area in immediate foreground is part of a levee that protects the soils from floods.



Figure 3.—View of a slack-water flat on the flood plain of the Mississippi River. The soybeans are on Sharkey clay.

2. Sharkey-Tunica association: Level, poorly drained and somewhat poorly drained, clayey soils on slack-water flats of the Mississippi River flood plain

The largest area of this association is southwest of Hickman, and the village of Bondurant is at its approximate center. Another large area begins north of Hickman and extends to the county line. A small area is in the middle of Kentucky Bend. The total acreage of this association is about 16 percent of the county; the dominant soils are the Sharkey (fig. 3) and Tunica.

Sharkey soils are poorly drained. Their surface layer, a very dark grayish-brown clay, overlies dark-gray clay that extends to a depth of more than 3 feet. The Sharkey soils occupy approximately 50 percent of this association.

Tunica soils are somewhat poorly drained. Their surface layer is dark grayish-brown clay, and it overlies mottled dark grayish-brown clay that extends to a depth of 2½ feet. Below this is silt loam or fine sandy loam. The Tunica soils make up approximately 39 percent of this association.

Minor soils in this association are the Forestdale and Dundee, which are on low terraces or old natural levees that border former channels of the river. These soils occupy about 10 percent of this soil association. Swamp areas in the vicinity of Bondurant, near the sloughs leading into Reelfoot Lake, make up about 1 percent of the association.

Nearly all of this association is in capability class III. In the levee-protected area, which is southwest of Hickman, most of the acreage is cropped continuously. Cotton, soybeans, and corn are the principal crops grown.

The areas not protected by levees are frequently flooded in the spring and, for the most part, are forested (fig. 4). In recent years, however, a few hundred acres of the land at highest elevation, principally on the Tunica soils, has been cleared and is cropped to corn.

Most of the farms within this association are large, and large areas on the farms are managed as a unit.

3. Memphis-Loring association: Well-drained soils on sloping to steep sides and gently sloping tops of loessial bluffs

This association begins southwest of Hickman and extends to the Tennessee line. The village of Brownsville is at the approximate center of the area, which averages

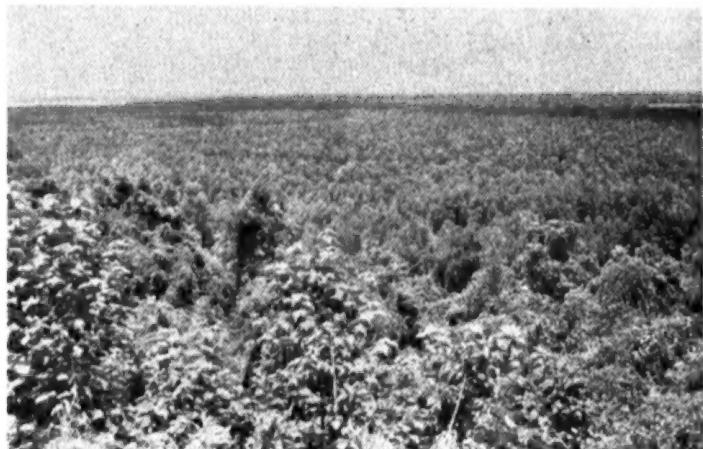


Figure 4.—View of the Mississippi River flood plain north of Hickman showing woods in an area not protected by levees.

about 2 miles in width. The total acreage of this association is about 5 percent of the county; the dominant soils are the Memphis and Loring (fig. 5).

Memphis soils are well drained and have a brown silt loam surface layer that overlies a brown silty clay loam subsoil. The Memphis soils occupy approximately 60 percent of this association.

Loring soils are well drained to moderately well drained. They have a surface layer of brown silt loam, a subsoil of brown silty clay loam, and a weak fragipan at a depth of about 32 inches. The Loring soils make up about 35 percent of this association.

The minor soils in this association are the somewhat poorly drained Wakeland and the moderately well drained Adler, both on bottom lands branching from the main flood plain of the Mississippi River. These minor soils occupy about 5 percent of the association.

The part of this association on steep side slopes is in capability classes VI and VII. Nearly all of the side slopes that are steep, those with slopes of 30 to 65 percent, are adjacent to the Mississippi River flood plain and are under forest.



Figure 5.—View in the Memphis-Loring soil association showing pasture on a severely eroded Memphis soil with a slope of 25 percent.

The parts of this association on the narrow tops of the bluffs are in capability classes II and III. These are of minor extent but are important agriculturally. Also important to agriculture are the areas in the narrow branch bottoms, which are in capability classes I and II.

Much of this association is used for hay and pasture. The principal cultivated crops—cotton, corn, and soybeans—are for the most part restricted to the narrow tops of the bluffs and to the branch bottoms.

Some areas of this association are idle. Most farms within this association are small and are operated by the owners.

4. Grenada-Calloway-Loring-Memphis association: Gently sloping, somewhat poorly drained to well-drained soils on loessial uplands dissected by many small drains

Most of the upland part of the county, or that part extending from the bluff area below Hickman to Fulton, is in this association. The total acreage is about 38 percent of the county; the dominant soils are the Grenada, Calloway, Loring, and Memphis (fig. 6).

The moderately well drained Grenada soils are on gently sloping to nearly level tops and gently sloping to sloping sides of ridges. These soils have a brown silt loam plow layer, a yellowish-brown silt loam subsoil, and, at a depth of about 2 feet, a fragipan of grayish silt loam or silty clay loam. The Grenada soils occupy approximately 30 percent of this association.

Calloway soils are level to gently sloping and somewhat poorly drained. They have a dark grayish-brown silt loam plow layer, a mottled grayish and brownish silt loam subsoil, and a fragipan of grayish silt loam or silty clay loam. The Calloway soils make up about 12 percent of this association.

The Loring and Memphis soils are on stronger slopes than the Grenada and Calloway soils, as they generally are on the sides of ridges that have narrower tops and higher elevations. The Loring soils are well drained to moderately well drained. They have a brown silt loam plow layer, a brown silty clay loam subsoil, and a weak fragipan at a depth of about 32 inches. The Memphis soils are

well drained. They have a brown silt loam plow layer and a brown silty clay loam subsoil. The Loring soils occupy about 25 percent of this association, and the Memphis soils, about 15 percent.

The minor soils in this association are the Henry, Collins, Falaya, Adler, Wakeland, and Patton. The poorly drained Henry soils are in level or depressed areas on the upland and make up about 1 percent of the association. The somewhat poorly drained Falaya soils and the moderately well drained Collins soils, which are composed of silty alluvium, are on branch bottoms east of Mud Creek. Together, the Falaya and Collins soils occupy approximately 9 percent of the association. The Adler, Wakeland, and Patton soils were derived from neutral silty alluvium. The Adler are moderately well drained; the Wakeland, somewhat poorly drained; and the Patton, very poorly drained. The Adler, Wakeland, and Patton soils are in branch bottoms along Mud Creek and occupy approximately 8 percent of the association.

The major part of this association is in capability classes II, III, and IV. Corn, soybeans, and cotton are the principal crops grown. These crops, and livestock, are the main sources of income. Most of the farms within this association are medium sized (100 to 160 acres), and nearly all are operated by owners.

5. Patton-Wakeland-Birds-Calloway association: Very poorly drained to somewhat poorly drained soils on nearly level flood plains, and nearly level to gently sloping soils on terraces

The largest area of this association is on the bottom lands along Mud Creek and along the lower reaches of the Bayou du Chien flood plain. A smaller area lies near soil association 3, and the soils there developed in outwash from soils of association 3. This association covers about 5 percent of the county; the dominant soils are the Patton, Wakeland, Birds, and Calloway.

Patton soils are on bottom lands along Mud Creek. They have a very dark grayish-brown silt loam plow layer, and a black silty clay loam subsoil that is underlain by a grayish layer at a depth of about 2½ feet. In some places these soils are covered by an outwash of dark grayish-brown silt loam that is 5 to 15 inches thick. The Patton soils make up about 30 percent of this association.

The somewhat poorly drained Wakeland soils are below the bluffs of soil association 3 and on the bottom lands along Mud Creek. They have a brown silt loam plow layer over a mottled brownish and grayish silt loam layer that extends to a depth of about 15 inches. Below this is a layer of grayish silt loam. The Wakeland soils occupy approximately 25 percent of this association.

The poorly drained Birds soils are in level or depressed areas on the bottom lands. They have a dark grayish-brown silt loam plow layer that is underlain by gray silt loam. Birds soils make up about 20 percent of this association.

The Calloway soils in this association are on the nearly level to gently sloping terraces along Mud Creek. These poorly drained soils do not occur in the part of this soil association that lies west of soil association 3. The Calloway soils in this association have a dark grayish-brown silt loam plow layer, a mottled brownish and grayish silt loam subsoil, and a grayish silty clay loam fragipan at a depth of about 18 inches. The Calloway soils occupy about 18 percent of this association.



Figure 6.—Gently sloping upland of the Grenada-Calloway-Loring-Memphis association. Soybeans on Grenada soils in foreground, and pasture on Calloway soils in background.

Minor soils in this association are the Henry and the Adler. The only Henry soil in this association is the one that occurs on terraces. It is on the terraces along Mud Creek, is poorly drained, and makes up about 5 percent of this association. The Adler soils, on outwash below the bluffs of soil association 3, are moderately well drained and occupy about 2 percent of this association.

The major part of this association is in capability classes II and III. Corn and soybeans are the principal crops. Most of the area north of State Highway 94 is forested and is frequently flooded by backwaters from the Mississippi River and headwaters from Bayou du Chien and Mud Creek.

Most of the farms within this association are medium sized and are operated by the owners.

6. Loring-Memphis association: Well drained and moderately well drained soils in thick loess of the sloping uplands

The largest area of this association is in the northeastern part of the county. A smaller area lies to the south of this large area, and another lies to the southwest. This association occupies about 6 percent of the county; the major soils in it are the Memphis and Loring.

Loring soils are well drained to moderately well drained. They have a brown silt loam plow layer, a brown silty clay loam subsoil, and a weak fragipan at a depth of about 32 inches. The Loring soils occupy approximately 50 percent of this association.

Memphis soils are well drained. They have a brown silt loam plow layer over a brown silty clay loam subsoil. The Memphis soils make up about 30 percent of this association.

The minor soils in this association are the Grenada, on some of the gentler slopes; and the Falaya and Collins, on the branch bottom lands. The Grenada soils occupy approximately 10 percent of this association, and the Falaya and Collins together, about 10 percent.

The major part of this association is in capability classes II, IV, and VI. Corn and soybeans are the principal crops. Some areas are used for hay and pasture. Most of the farms are small and are operated by the owners.

One of the major sources of gravel for the county is in this association. This pit is on the east side of U.S. Highway 51, south of the Hickman County line. The source of the gravel is the Coastal Plain formation, which is covered with 10 feet or less of loessial material.

7. Waverly-Falaya-Calloway association: Poorly drained and somewhat poorly drained soils on acid, silty alluvium of the level flood plains and nearly level to gently sloping terraces

This association is along the flood plain of Little Bayou du Chien. Its total area is about 4 percent of the county. The major soils are the Waverly, Falaya, and Calloway.

The Waverly are poorly drained soils on bottom lands. They have a surface layer of mottled grayish-brown silt loam that overlies gray silt loam.

The Falaya are somewhat poorly drained soils on bottom lands. Their brownish silt loam surface layer overlies mottled brown and grayish-brown silt loam that extends to a depth of 15 inches. The grayness increases below 15 inches.

About 45 percent of this association is made up of Waverly and Falaya soils that occur in such a complex

pattern that mapping them separately was impractical. About 30 percent of this association consists of Falaya soils that were mapped separately.

The Calloway soils in this association are on terraces. These soils are nearly level to gently sloping and are somewhat poorly drained. They have a dark grayish-brown silt loam plow layer, a mottled brownish and grayish silt loam subsoil, and a grayish silty clay loam fragipan at a depth of about 18 inches. These Calloway soils occupy about 20 percent of the association.

The only Henry soil in this association is the one that occurs on terraces. This poorly drained soil occupies about 5 percent of the association.

Most of this association is in capability class III and is forested. The Falaya soils, where mapped separately from Waverly and Calloway soils, are used largely for pasture, soybeans, and corn. Most of the farms are medium sized and owner operated.

Descriptions of the Soils

This section is provided for those who want fairly detailed, nontechnical descriptions of the soil series and mapping units in Fulton County. For more general information about the soils of the county, the reader can refer to the section "General Soil Map," in which broad patterns of soils are described; or, if he wants detailed, technical descriptions of soil series he can refer to the section "Formation, Morphology, and Classification of the Soils."

In the pages that follow, the soil series and mapping units of Fulton County are described in alphabetic order, by soil series name. Each series is described, and then the mapping units, or single soils, of that series. A soil profile is described for the first mapping unit of each series, and this profile is considered representative, or typical, for all the other mapping units of that series. The profile of some mapping units will differ somewhat from the representative profile, but these differences are evident in the name of each mapping unit or are pointed out in its description.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map in the back of the report. The description of each mapping unit ends with a reference to the capability unit and woodland suitability group in which it has been placed. Capability units and woodland suitability groups are described in the sections "Use of the Soils for Agriculture" and "Use of the Soils for Woodland."

Descriptions of soil series and mapping units contain some technical terms because there are no nontechnical terms that convey precisely the same meaning. Technical terms are defined in the Glossary.

Table 1 shows the approximate acreage and proportionate extent of the soils in the county.

Adler Series

The level to nearly level, moderately well drained soils of the Adler series are on bottom lands closely associated with the bluff area and along the tributaries of Mud Creek. These soils are composed of neutral silty alluvium.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent	Soil	Area	Extent
	<i>Acres</i>	<i>Percent</i>		<i>Acres</i>	<i>Percent</i>
Adler silt loam.....	258	0.2	Loring silty clay loam, 6 to 12 percent slopes, severely eroded.....	5,777	4.4
Beulah fine sandy loam.....	267	.2	Loring silty clay loam, 12 to 20 percent slopes, severely eroded.....	1,531	1.2
Birds silt loam.....	1,801	1.4	Made land.....	244	.2
Bosket silt loam.....	365	.3	Memphis silt loam, 0 to 2 percent slopes.....	158	.1
Calloway silt loam, 0 to 2 percent slopes.....	2,309	1.8	Memphis silt loam, 2 to 6 percent slopes.....	4,741	3.6
Calloway silt loam, 2 to 6 percent slopes.....	2,697	2.1	Memphis silt loam, 2 to 6 percent slopes, eroded.....	1,634	1.2
Calloway silt loam, terrace, 0 to 2 percent slopes.....	1,443	1.1	Memphis silt loam, 6 to 12 percent slopes, eroded.....	721	.5
Calloway silt loam, terrace, 2 to 6 percent slopes.....	1,602	1.2	Memphis silt loam, 12 to 20 percent slopes, eroded.....	248	.2
Collins silt loam.....	627	.5	Memphis silt loam, 30 to 65 percent slopes.....	2,057	1.6
Commerce silt loam.....	853	.6	Memphis silty clay loam, 6 to 12 percent slopes, severely eroded.....	1,326	1.0
Commerce silt loam, low.....	10,295	7.8	Memphis silty clay loam, 12 to 20 percent slopes, severely eroded.....	1,337	1.0
Commerce silty clay loam.....	4,115	3.1	Memphis silty clay loam, 20 to 30 percent slopes, severely eroded.....	1,723	1.3
Commerce silty clay loam, low.....	1,703	1.3	Patton silt loam.....	991	.8
Crevasse loamy fine sand.....	1,004	.8	Patton silt loam, overwash.....	1,861	1.4
Dubbs silt loam.....	2,547	1.9	Riverwash, gravelly.....	138	
Dundee silty clay loam.....	1,161	.9	Riverwash, sandy.....	2,823	2.1
Falaya silt loam.....	1,024	.8	Robinsonville fine sandy loam.....	1,405	1.1
Falaya silt loam.....	3,263	2.5	Robinsonville silt loam.....	7,505	5.7
Forestdale silty clay loam.....	1,000	.8	Robinsonville silty clay loam.....	462	.3
Grenada silt loam, 0 to 2 percent slopes.....	1,164	.9	Sharkey clay.....	9,263	7.1
Grenada silt loam, 2 to 6 percent slopes.....	5,587	4.3	Sharkey silty clay loam, overwash.....	1,296	1.0
Grenada silt loam, 2 to 6 percent slopes, eroded.....	4,938	3.8	Swamp.....	1,234	.9
Grenada silt loam, 2 to 6 percent slopes, severely eroded.....	933	.7	Tunica clay.....	8,122	6.2
Grenada silt loam, 6 to 12 percent slopes, eroded.....	2,578	2.0	Wakeland silt loam.....	2,323	1.8
Grenada silt loam, 6 to 12 percent slopes, severely eroded.....	2,473	1.9	Waverley-Falaya silt loams.....	2,818	2.1
Gullied land.....	298	.2	Water areas.....	715	.5
Henry silt loam.....	327	.2	Total land area.....	131,200	100.0
Henry silt loam, terrace.....	894	.7			
Loring silt loam, 0 to 2 percent slopes.....	325	.2			
Loring silt loam, 2 to 6 percent slopes.....	7,112	5.4			
Loring silt loam, 2 to 6 percent slopes, eroded.....	1,643	1.3			
Loring silt loam, 6 to 12 percent slopes, eroded.....	1,691	1.3			
Loring silt loam, 12 to 20 percent slopes, eroded.....	215	.2			
Loring silty clay loam, 2 to 6 percent slopes, severely eroded.....	235	.2			

Adler soils have a brown silt loam surface layer 20 inches thick, which overlies a mottled grayish and brownish silt loam layer that extends to a depth of 30 inches. Below this is a gray silt loam layer.

These soils are moderate in content of organic matter and moderately high in content of plant nutrients.

Adler soils are associated with Wakeland and Birds soils. They are better drained than the Wakeland and Birds soils, are less mottled, and have a less gray color from the surface to a depth of 20 inches. They closely resemble Collins soils but are less acid in reaction.

The Adler soils are suited to a wide range of crops.

Adler silt loam (0 to 4 percent slopes) (Ad).—This moderately well drained soil consists of young silty alluvium and is on bottom lands.

Profile description:

0 to 20 inches, brown, very friable silt loam.

20 to 30 inches, mottled brown and grayish-brown, very friable silt loam.

30 to 48 inches, gray, friable, massive silt loam with dark brown mottles.

The surface layer ranges from brown to dark grayish brown or dark brown. In some places, at a depth of about 2 feet, this soil abruptly overlies poorly drained Mississippi River alluvium or Patton-like soil.

Small areas of a soil with a loam surface layer were mapped with Adler silt loam.

This soil has a deep root zone, high moisture-supplying capacity, moderately high natural fertility, favorable workability, moderately rapid permeability, and moderate organic-matter content. Drainage is not necessary for good yields, but it allows earlier planting and the tillage and other management required for high yields. Flooding is not a serious problem, as the overflows last only a few hours.

Nearly all of this soil has been cleared. (Capability unit I-2; woodland suitability group 8.)

Beulah Series

The Beulah series is made up of nearly level, somewhat excessively drained soils on old natural levees that border former channels of the Mississippi River. These soils were derived from alluvium deposited by the river.

Beulah soils have a very dark grayish-brown plow layer of fine sandy loam, and a subsoil of brown fine sandy loam that is underlain by loamy fine sand or fine sand at a depth of 16 to 34 inches.

These soils are slightly acid and medium in content of organic matter and plant nutrients.

Beulah soils are associated with Bosket and Dubbs soils. They have a coarser texture and less profile development than the Bosket and Dubbs soils. They have more profile development and a finer texture than the Crevasse soils.

The Beulah soils are suited to a wide range of crops.

Beulah fine sandy loam (0 to 4 percent slopes) [Ba].—This somewhat excessively drained soil was derived from river alluvium and is on natural levees of the flood plain, for the most part in the vicinity of Western School.

Profile description:

- 0 to 9 inches, very dark grayish-brown, very friable fine sandy loam.
- 9 to 30 inches, brown, very friable fine sandy loam, slightly compact in place.
- 30 to 60 inches +, pale-brown or brown loose fine sand.

The surface layer ranges from very dark grayish brown to dark brown. In some places, the second layer is composed of loamy fine sand in which there are 2- to 3-inch bands of either fine sandy loam or loam, and the lower part of the last layer is light-gray sand.

Small areas of a soil with loam or very fine sandy loam in the surface layer were included in the mapping of Beulah fine sandy loam.

This soil has a deep root zone, high moisture-supplying capacity, moderately high natural fertility, favorable workability, moderately rapid permeability, and medium organic-matter content.

Practically all of this soil is used continuously for row crops. (Capability unit I-3; woodland suitability group 8.)

Birds Series

In the Birds series are level, poorly drained soils that are on the Mud Creek flood plain and on bottom lands in places closely associated with the bluff area. These soils were derived from neutral silty alluvium. Their native vegetation is chiefly water-tolerant oaks, gum, and ash. Cottonwood has reforested some abandoned land and cut-over areas.

Birds soils have a plow layer of dark grayish-brown silt loam that is underlain by grayish-brown or gray silt loam. They are low in content of organic matter and moderately low in content of plant nutrients.

The Birds soils are associated with Wakeland and Patton soils. They have poorer drainage, are grayer, and more highly gleyed than Wakeland soils; and they lack the black, clayey subsoil of the Patton soils. Birds soils closely resemble Waverly soils but are slightly acid to neutral rather than strongly acid.

Workability, planting time, and the range of crops are limited because of poor drainage.

Birds silt loam (0 to 2 percent slopes) [Bd].—This poorly drained soil was derived from neutral silty alluvium on the bottom lands.

Profile description:

- 0 to 7 inches, dark grayish-brown, very friable silt loam with dark-brown mottles.
- 7 to 48 inches +, grayish-brown, or gray mottled with brown, massive, very friable silt loam.

The surface layer in some places is evenly mottled with gray and brown, and in some wooded areas it is only 2 to 4 inches thick. At a depth of about 2 feet this soil is under-

lain by poorly drained Mississippi River alluvium or Patton-like buried soil.

This soil has a deep root zone, very high moisture-supplying capacity, moderately low natural fertility, moderate permeability, and low organic-matter content. Where outlets are available this soil responds to drainage and other management that widen the range of suited crops.

About half of this soil has been cleared and is used continuously for row crops. (Capability unit IIIw-5; woodland suitability group 3.)

Bosket Series

Soils of the Bosket series are nearly level and well drained. They were derived from alluvium deposited by the Mississippi River and cover a small area on the natural levees that border former channels of the river.

Bosket soils have a plow layer of very dark grayish-brown silt loam, and a subsoil of very dark grayish-brown silty clay loam that is underlain, at a depth of 2 feet, by brown fine sandy loam or loamy fine sand.

These soils are slightly acid and medium in content of organic matter and plant nutrients.

Associated with the Bosket soils are the Beulah, Dubbs, and Dundee soils. They have more distinct horizons than the Beulah soils, and a finer texture. They are better drained than the Dubbs and Dundee soils, and they have less distinct horizons, less clay in their subsoil, and sandy underlying material nearer the surface.

The Bosket soils are suited to a wide range of crops.

Bosket silt loam (0 to 4 percent slopes) [Bo].—This well-drained soil was derived from river alluvium on natural levees that border former channels of the Mississippi River.

Profile description:

- 0 to 8 inches, very dark grayish-brown, very friable silt loam.
- 8 to 24 inches, very dark grayish-brown, firm silty clay loam with blocky structure.
- 24 to 48 inches +, brown, very friable fine sandy loam or loamy fine sand.

In some places there is a layer of black, friable silt loam between the first and second layers. Depth to the third layer ranges from 18 to 27 inches.

This soil has a deep root zone, high moisture-supplying capacity, moderate natural fertility, favorable workability, and medium organic-matter content. Permeability is moderate within the first two layers and rapid within the third. This soil responds to management.

Practically all of this soil has been cleared and is now used continuously for row crops. (Capability unit I-3; woodland suitability group 8.)

Calloway Series

The Calloway series consists of somewhat poorly drained soils on uplands and stream terraces where slopes range from 0 to 6 percent. These soils developed in thick loess and cover a large area in the county. The native vegetation is chiefly oak, gum, and hickory.

Where they have not been eroded, Calloway soils have a plow layer of dark grayish-brown silt loam, a subsoil of mottled yellowish-brown and grayish-brown silt loam, and a well-developed fragipan of light brownish-gray silt loam or silty clay loam at a depth of 14 to 24 inches.

These soils are strongly acid and low in content of organic matter and plant nutrients.

Calloway soils are associated with Grenada and Henry soils. They are better drained than Henry soils, and are less gray and gleyed. They have poorer drainage, a grayer subsoil, and more mottles than Grenada soils.

Poor drainage limits the range of crops and ease with which Calloway soils can be worked.

Calloway silt loam, 0 to 2 percent slopes (C_aA).—This is a somewhat poorly drained soil with a well-developed fragipan.

Profile description:

- 0 to 7 inches, dark grayish-brown, very friable silt loam.
- 7 to 17 inches, mottled yellowish-brown and light grayish-brown, friable silt loam of weak blocky structure.
- 17 to 48 inches, light brownish-gray, very firm, compact, brittle silty clay loam or silt loam fragipan.
- 48 to 60 inches +, mottled yellowish-brown and light brownish-gray, friable silt loam.

The plow layer ranges from dark grayish brown to brown. The fragipan begins 14 to 24 inches from the surface and is 24 to 36 inches thick. The underlying material is 20 to 50 feet thick and, in places, is calcareous below a depth of 20 feet.

This strongly acid soil has moderately low natural fertility, favorable workability, and low organic-matter content. The root zone is shallow to moderately deep, and the moisture-supplying capacity is moderately low because the fragipan limits the depth to which roots can grow and the capacity of the soil to hold moisture that plants can use. Permeability is moderate down to the fragipan, and slow in the fragipan. This soil responds slowly to management; it is suited to crops that do not require good drainage.

Practically all of this soil has been cleared and is now used for crops and pasture. (Capability unit IIIw-1; woodland suitability group 7.)

Calloway silt loam, 2 to 6 percent slopes (C_aB).—Stronger slopes and more rapid surface runoff distinguish this soil from Calloway silt loam, 0 to 2 percent slopes. Drainage is less a problem in this soil, but erosion is a slight hazard. The range of suited crops is not quite so limited. Most of this soil is in crops and pasture. (Capability unit IIIw-3; woodland suitability group 9.)

Calloway silt loam, 2 to 6 percent slopes, eroded (C_aB2).—This soil has stronger slopes than Calloway silt loam, 0 to 2 percent slopes. The plow layer is lower in organic-matter content and contains some subsoil material. Depth to the fragipan is less, so this soil has a lower moisture-supplying capacity and a shallower root zone. The stronger slopes and more rapid surface runoff have caused moderate erosion and have made drainage less a problem. All of this soil is used for crops and pasture. (Capability unit IIIw-3; woodland suitability group 9.)

Calloway silt loam, terrace, 0 to 2 percent slopes (C_bA).—This soil is at a lower level than Calloway silt loam, 0 to 2 percent slopes. The fragipan is not quite so firm and compact, and the potential for wood crop production is higher. At a depth below 30 inches, this soil is neutral to slightly acid.

This soil is associated with alluvial soils of the creek bottoms. During very high floods, backwater from the Mississippi River overflows this soil on the lower reaches

of Mud Creek, Bayou du Chien, and Little Bayou du Chien. Twenty-five percent of this soil, all of it in areas subject to floods, is wooded. (Capability unit IIIw-1; woodland suitability group 6.)

Calloway silt loam, terrace, 2 to 6 percent slopes (C_bB).—Stronger slopes and a lower position distinguish this soil from Calloway silt loam, 0 to 2 percent slopes. Drainage is less a problem in this soil because of the stronger slopes and more rapid surface runoff, but erosion is a slight hazard. The fragipan is less firm and not so compact, and the potential for wood crop production is higher. Reaction is neutral to slightly acid at a depth below 30 inches.

Mapped with this soil are some small areas of eroded soils.

This soil is associated with the alluvial soils of the creek bottoms. During very high floods, backwater from the Mississippi River overflows this soil on the lower reaches of Mud Creek, Bayou du Chien, and Little Bayou du Chien.

Most of this soil is used for crops and pasture. (Capability unit IIIw-3; woodland suitability group 6.)

Collins Series

The level to nearly level, moderately well drained soils of the Collins series are on areas of bottom land in the upper reaches of Little Bayou du Chien and its tributaries. These soils are composed of alluvium washed from loessial uplands.

Collins soils have a brown silt loam surface layer 20 inches thick. It is underlain by a mottled brown and light brownish-gray silt loam layer that extends to a depth of 30 inches. Below this is a grayish-brown silt loam layer with brown mottles.

The Collins soils are strongly acid, moderate in content of organic matter, and medium in content of plant nutrients.

Collins soils are browner and better drained than the associated Falaya soils. They closely resemble Adler soils, but are more acid in reaction.

The Collins soils are suited to a wide range of crops.

Collins silt loam (0 to 4 percent slopes) (C_c).—This moderately well drained soil is on young silty alluvium in the small, branch bottoms.

Profile description:

- 0 to 20 inches, brown, very friable silt loam.
- 20 to 30 inches, mottled brown and light brownish-gray, very friable silt loam.
- 30 to 48 inches +, light brownish-gray or grayish-brown, very friable, massive silt loam with brown mottles.

The first layer ranges from brown to yellowish brown. The second layer, in places, extends to a depth greater than 48 inches. Small areas of well-drained soils were mapped with Collins silt loam.

This soil has a high moisture-supplying capacity, moderate natural fertility, favorable workability, moderate permeability, and medium organic-matter content. It responds well to management. Drainage is not necessary for good yields, but it allows earlier planting and the tillage and other management required for high yields. Flooding is not a serious problem, as the overflows last only a few hours.

Nearly all of this soil has been cleared and is used continuously for row crops. (Capability unit I-2; woodland suitability group 8.)

Commerce Series

The level, moderately well drained to somewhat poorly drained soils of the Commerce series are on natural levees of the Mississippi River flood plain. These soils were derived from river alluvium and occupy a large area in the county.

Commerce soils are very dark grayish brown or dark grayish brown to a depth of 14 inches; below this, they are mottled with gray, grayish brown, and dark grayish brown. They range in texture from silt loam to silty clay loam, but the silt loam is much more extensive.

These soils are neutral in reaction, moderate in content of organic matter, and high in content of plant nutrients.

The Commerce soils have more mottles and poorer drainage than the associated Robinsonville soils. They have drainage similar to that of the Dundee soils but have less profile development and have a coarser textured subsoil.

Commerce soils are suited to a wide range of crops.

Commerce silt loam (0 to 2 percent slopes) (Cm).—This moderately well drained to somewhat poorly drained soil was derived from Mississippi River alluvium and is on natural levees of the flood plain.

Profile description:

0 to 14 inches, very dark grayish-brown to dark grayish-brown, very friable silt loam.
14 to 40 inches, mottled grayish-brown and dark-gray, friable silt loam with a few mottles of dark brown.
40 to 48 inches +, dark-gray or gray, firm silty clay loam.

In some places this soil has stratified second and third layers of fine sandy loam, silt loam, and silty clay loam. In many places close to the river, the second layer overlies fine sandy loam.

Small areas of a soil with a loam surface layer were included in mapping Commerce silt loam.

This soil has a deep root zone, very high moisture-supplying capacity, high natural fertility, favorable workability, moderate permeability, and moderate organic-matter content. Drainage is not necessary for good yields, but it allows earlier planting and the tillage and other management required for high yields.

In levee-protected areas, all of this soil has been cleared and is used for continuous growing of row crops, although it is suitable for many crops, including alfalfa. In areas not protected by levees, about three-fourths of the acreage has been cleared and is in row crops, and the rest is wooded. Winter crops usually are not grown, because overflow is a hazard. (Capability unit I-2; woodland suitability group 8.)

Commerce silt loam, low (0 to 2 percent slopes) (Co).—This soil is slightly grayer and more mottled than Commerce silt loam and occurs in depressions at lower levels. Drainage is a problem in levee-protected areas where seep water and runoff from surrounding soils collect. The wetness restricts use of this soil for alfalfa or other crops that require good drainage. Most of the soil in areas protected by levees has been cleared and is now used continuously for row crops. Those areas not protected by levees are wet much of the year as a result of spring overflows that last 2 to 6 weeks. Nearly all of this unprotected

acreage remains in forest consisting mainly of cottonwood, willow, cypress, ash, and water-tolerant oaks. (Capability unit IIw-4; woodland suitability group 4.)

Commerce silty clay loam (0 to 2 percent slopes) (Cr).—A higher clay content distinguishes this soil from Commerce silt loam. Also, this soil is more difficult to work and has slower permeability. The range of suitable crops is not so wide, because this soil occurs only in those unprotected areas subject to early spring overflows lasting from 1 to 4 weeks. About half of this soil remains in woods consisting of cottonwood, willow, and bottom-land hardwoods. The cleared part of this soil is used continuously for row crops. (Capability unit IIw-4; woodland suitability group 8.)

Commerce silty clay loam, low (0 to 2 percent slopes) (Cs).—This soil has a higher clay content than Commerce silt loam, is more difficult to work, has slower permeability, and occurs in depressions at lower levels. Practically all of this soil is unprotected by levees and, therefore, is subject to overflows lasting 2 to 6 weeks. This soil stays wet much of the year because the floodwaters drain away slowly. Nearly all of it is wooded, mainly with cottonwood and willow. (Capability unit IIw-4; woodland suitability group 4.)

Crevasse Series

Soils of the Crevasse series are level to nearly level and excessively drained. They were derived from sandy alluvium deposited by the Mississippi River and are on natural levees adjacent to the river.

The surface layer of the Crevasse soils is dark grayish-brown loamy fine sand. It is underlain by grayish-brown fine sand that extends to a depth of 2 feet. Below this is grayish loamy fine sand.

Crevasse soils are slightly acid and low in content of organic matter and plant nutrients.

The Crevasse soils are associated with the Robinsonville soils but are coarser textured and lighter colored. They are coarser textured than Beulah soils, and their profile is less developed.

Crevasse loamy fine sand (0 to 4 percent slopes) (Cv).—This excessively drained soil was derived from sandy alluvium on natural levees near the Mississippi River.

Profile description:

0 to 6 inches, dark grayish-brown, very friable loamy fine sand.
6 to 25 inches, grayish-brown, loose fine sand.
25 to 48 inches +, light brownish-gray to dark grayish-brown, very friable or loose loamy fine sand.

The first layer ranges from grayish brown to dark brown. In some places, the last layer is underlain, at a depth of 36 inches or more, by dark grayish-brown silt loam or by alternate layers of sand and silt.

Mapped areas of this soil include a small acreage of Crevasse-like soil material over poorly drained, silty alluvium deposited by the Mississippi River.

Crevasse loamy fine sand has a deep root zone, moderately low natural fertility, favorable workability, rapid permeability, and low organic-matter content. It has a moderately low moisture-supplying capacity and is droughty late in summer and in fall.

Use of this soil is limited mainly to growing of winter and spring crops or drought-resistant crops. Most of

this soil is wooded with a mixed growth of cottonwood, stunted woody brush, some elm, and some ash. (Capability unit III_s-1; woodland suitability group 5.)

Dubbs Series

In the Dubbs series are level to nearly level, well drained to moderately well drained soils on natural levees that border former channels of the Mississippi River. These soils were derived from alluvium deposited by the river. They are not extensive in the county.

Dubbs soils have a very dark grayish-brown silt loam plow layer; a dark-brown silty clay loam upper subsoil; a mottled, dark yellowish-brown silty clay loam lower subsoil; and a brown very fine sandy loam at a depth of 3 feet.

The Dubbs soils are slightly acid, medium in content of organic matter, and moderately high in content of plant nutrients.

Associated with the Dubbs soils are the Beulah, Bosket, Dundee, and Forestdale soils. The Dubbs have finer texture, more distinct horizons, and poorer drainage than the Beulah soils. They have more distinct horizons than the Bosket soils, have poorer drainage, and are deeper to the underlying more sandy material. They have better drainage, fewer mottles, and a browner subsoil than the Dundee and Forestdale soils. Dubbs soils are similar to Robinsonville soils but lack their profile development.

The Dubbs soils are suited to a wide range of crops.

Dubbs silt loam (0 to 4 percent slopes) (Db).—This well drained to moderately well drained soil is on natural levees that border former channels of the Mississippi River.

Profile description:

0 to 6 inches, very dark grayish-brown, very friable silt loam.
6 to 24 inches, dark-brown to dark yellowish-brown, firm silty clay loam of blocky structure.
24 to 36 inches, brown, very friable silt loam of weak blocky structure.
36 to 48 inches +, brown, very friable very fine sandy loam.

Depth to the last layer ranges from 28 to 40 inches, and the texture of that layer ranges from fine sandy loam to loamy fine sand. The third layer ranges from silt loam to loam and is absent in some places.

Small areas of a soil with a silty clay loam surface layer were included in mapping Dubbs silt loam.

This soil has a deep root zone, high moisture-supplying capacity, moderately high natural fertility, moderate permeability, and medium organic-matter content. It responds well to management.

A small area of this soil, on the higher bottom lands north of Hickman, is flooded by very high water for a period of 1 to 3 weeks.

Nearly all of this soil has been cleared. (Capability unit I-3; woodland suitability group 8.)

Dundee Series

The Dundee series is made up of level to nearly level, moderately well drained to somewhat poorly drained soils on natural levees or low terraces that border former channels of the Mississippi River. These soils were derived from river alluvium. They are not extensive in the county.

Dundee soils have a plow layer of very dark grayish-brown silty clay loam, an upper subsoil of dark grayish-brown silty clay, and a lower subsoil of dark-gray silty clay loam. Below this, at a depth of 40 inches, there is mottled grayish-brown and dark yellowish-brown fine sandy loam.

These soils are slightly acid, medium in content of organic matter, and moderately high in content of plant nutrients.

Dundee soils are associated with Bosket, Dubbs, and Forestdale soils. They have poorer drainage than the Bosket and Dubbs soils, and a grayer and finer textured subsoil. They are better drained than the Forestdale soils, and are less gray and gleyed in the upper subsoil. They have drainage similar to that of Commerce soils but have more profile development.

The Dundee soils are suited to a wide range of crops, although drainage and tillage are slight problems.

Dundee silty clay loam (0 to 4 percent slopes) (Du).—This moderately well drained to somewhat poorly drained soil was derived from Mississippi River alluvium and is on natural levees that border former channels of the river. Small areas are in the vicinity of Western School and near the Tennessee State line on both sides of Kentucky Highway 311.

Profile description:

0 to 6 inches, very dark grayish-brown, friable silty clay loam.
6 to 20 inches, dark yellowish-brown or dark grayish-brown, mottled with grayish brown or brown, firm silty clay of blocky structure.
20 to 40 inches, dark-gray, mottled with brown, firm silty clay loam of blocky structure; lower half is of loam texture in some places.
40 to 50 inches +, mottled grayish-brown and dark yellowish-brown, very friable fine sandy loam.

The first layer, in some places, is black and extends to a depth of 12 inches. The last layer ranges from fine sandy loam to silt loam; it is at a depth of between 30 and 48 inches.

This soil has a deep root zone, high moisture-supplying capacity, high natural fertility, somewhat favorable workability, moderate permeability, and medium organic-matter content. It responds well to management.

Nearly all of this soil has been cleared and is now used for continuous growing of row crops. Where surface drainage is adequate, alfalfa is grown successfully. (Capability unit IIw-4; woodland suitability group 8.)

Falaya Series

The Falaya series consists of nearly level, somewhat poorly drained soils on the flood plains of Little Bayou du Chien and its tributaries, and on other branch bottom lands to the east. These soils are composed of silty alluvium and occupy a large area in the county. The native vegetation is mainly water-tolerant oaks, gum, maple, and ash.

Falaya soils have a brown silt loam plow layer, underlain by brown, mottled with gray, silt loam that extends to a depth of 15 inches. Below this, there is grayish-brown or gray silt loam mottled with yellowish brown.

These soils are strongly acid; they are moderate to low in content of organic matter and medium in content of plant nutrients.

Falaya soils are associated with Collins and Waverly soils. They have poorer drainage and more mottling than the Collins soils, and are grayer near the surface. They have a browner plow layer and better drainage than the Waverly soils.

Excessive surface water and overflow are limitations but, with adequate drainage, these soils are productive of a fairly wide range of crops.

Falaya silt loam (0 to 2 percent slopes) (Fa).—This somewhat poorly drained soil is on the flood plains of Little Bayou du Chien and its tributaries. It consists of young silty alluvium.

Profile description:

0 to 7 inches, brown, very friable silt loam.

7 to 15 inches, brown, very friable silt loam with brownish-gray mottles.

15 to 48 inches, grayish-brown in the upper part and gray in the lower part, friable to very friable, massive silt loam with brown mottles.

The plow layer ranges from brown to dark grayish brown. In places the second layer is evenly mottled with brown and gray and extends to a depth of 20 inches.

This strongly acid soil has a deep root zone, high moisture-supplying capacity, favorable workability, moderate natural fertility, moderately rapid permeability, and medium organic-matter content. During seasons of high rainfall, this soil is subject to overflows of short duration.

Practically all of this soil has been cleared and is now used for row crops and pasture. (Capability unit IIw-4; woodland suitability group 3.)

Forestdale Series

The level to nearly level, poorly drained to somewhat poorly drained soils of the Forestdale series are on low terraces that border former channels of the Mississippi River. These soils were derived from river alluvium.

Forestdale soils have a plow layer of very dark grayish-brown silty clay loam, an upper subsoil of grayish-brown clay, and a lower subsoil of gray clay that extends to a depth of about 40 inches. Below this is a coarser material, a very fine sandy loam or silt loam.

These soils are slightly acid, medium in organic-matter content, and moderately high in content of plant nutrients.

Forestdale soils are associated with Dubbs and Dundee soils. They are more poorly drained than the Dubbs and Dundee soils, and in the subsoil are gleyed, finer textured, and more gray. They are similar to the Sharkey soils, but have more profile development and are a lighter gray in the subsoil.

Excessive surface water is the main limitation; tillage is a slight problem. If adequately drained, these soils are suited to a wide range of crops.

Forestdale silty clay loam (0 to 4 percent slopes) (Fo).—This poorly drained to somewhat poorly drained soil is on low terraces near the Tennessee State line on both sides of Kentucky Highway 311.

Profile description:

0 to 6 inches, very dark grayish-brown, firm silty clay loam.
6 to 18 inches, grayish-brown, mottled with brown, very firm, sticky clay of weak blocky structure.

18 to 40 inches, gray, mottled with brown, very firm, sticky clay of weak blocky structure.

40 to 50 inches +, gray, mottled with brown, very friable silt loam or very fine sandy loam.

The plow layer ranges from very dark grayish brown to very dark gray and extends to a depth of as much as 12 inches. In some places the second layer is absent. Depth to the last layer ranges from 30 inches to more than 50 inches.

This soil is strongly acid to neutral in reaction. It has a moderately deep root zone, high moisture-supplying capacity, moderately high natural fertility, somewhat favorable workability, moderately slow permeability, and moderate organic-matter content. It responds slowly to management but is suitable for growing most locally grown crops.

Practically all of this soil has been cleared and is used continuously for row crops. (Capability unit IIIw-9; woodland suitability group 4.)

Grenada Series

The Grenada series consists of moderately well drained soils on uplands and stream terraces where slopes range from 0 to 12 percent. These soils developed in thick loess and have a fragipan at a depth of 20 to 28 inches. They occupy a large area in the county. The native vegetation is chiefly oak, hickory, gum, and some yellow-poplar.

Where they have not been eroded, Grenada soils have a brown silt loam plow layer over a yellowish-brown silt loam subsoil that is underlain by a light brownish-gray silty clay loam fragipan.

Grenada soils are strongly acid, medium in content of organic matter, and moderately low in content of plant nutrients.

The Grenada soils are associated with Calloway and Loring soils. They are better drained than the Calloway soils, and are less gray and mottled in the subsoil. They have poorer drainage than the Loring soils, and have a yellower subsoil and a grayer, more compact fragipan.

Grenada soils are slightly wet during seasons of high rainfall. Erosion is a great hazard, except in nearly level areas.

Grenada silt loam, 2 to 6 percent slopes (GrB).—This moderately well drained soil with a well-developed fragipan is on gently sloping uplands and stream terraces.

Profile description:

0 to 8 inches, brown, very friable silt loam.

8 to 24 inches, yellowish-brown, friable to firm silt loam of blocky structure; mottled with pale brown in lower half.
24 to 45 inches, light brownish-gray, very brittle, compact silty clay loam fragipan with brown mottles.

45 to 60 inches +, mottled yellowish-brown and light brownish-gray, very friable, massive silt loam.

The plow layer ranges from brown to grayish brown. The mottles in the lower half of the second layer range from pale brown to light gray. The last layer, in some places, is predominantly yellowish-brown and has small black concretions throughout. This layer ranges from 15 to 50 feet in thickness and, in places, is calcareous below a depth of 20 feet.

Mapped with this soil are some small areas of terrace soils that, at a depth of 30 inches, are nearly neutral in reaction.

This strongly acid soil has moderately low natural fertility, favorable workability, and medium organic-matter content. The root zone is moderately deep. The moisture-supplying capacity is moderately high because the

fragipan restricts the depth to which roots can grow and the capacity of the soil to hold moisture. Permeability is moderate down to the fragipan, and slow in the fragipan.

This soil responds well to management and is suited to a wide range of crops. It is slightly wet during seasons of high rainfall. Erosion is a slight hazard because of the gentle slopes. Practically all of this soil has been cleared and is now used for crops and pasture. (Capability unit IIe-6; woodland suitability group 9.)

Grenada silt loam, 0 to 2 percent slopes (GrA).—Less slope and slower surface runoff distinguish this soil from Grenada silt loam, 2 to 6 percent slopes. Drainage is more of a problem in this soil, but erosion is not a hazard. This soil responds well to management. When adequately drained, it is suitable for a wide range of crops.

Nearly all of this soil has been cleared and is now used for crops and pasture. (Capability unit IIw-2; woodland suitability group 9.)

Grenada silt loam, 2 to 6 percent slopes, eroded (GrB2).—As a result of erosion and cultivation, the plow layer of this soil is a mixture of original surface soil and subsoil. This soil has a slightly shallower root zone than Grenada silt loam, 2 to 6 percent slopes; a slightly lower moisture-supplying capacity; and a lower organic-matter content. On this soil, the response to management is good and a wide range of crops can be grown. (Capability unit IIe-6; woodland suitability group 9.)

Grenada silt loam, 2 to 6 percent slopes, severely eroded (GrB3).—The plow layer of this severely eroded soil consists almost entirely of yellowish-brown subsoil. Depth to the fragipan is less than in Grenada silt loam, 2 to 6 percent slopes, so this soil has a shallower root zone and a lower moisture-supplying capacity. Also, because its plow layer is largely subsoil, workability of this soil is not so favorable, its organic-matter content is very low, and its natural fertility is low. Surface runoff is more rapid, and the hazard of erosion is slightly greater.

On this soil, the response to management is fair and the range of suitable crops is not so wide as on Grenada silt loam, 2 to 6 percent slopes.

Practically all of this soil is used for crops and pasture, but a few areas are idle. (Capability unit IIIe-11; woodland suitability group 10.)

Grenada silt loam, 6 to 12 percent slopes, eroded (GrC2).—Stronger slopes and a plow layer that is a mixture of original surface soil and subsoil distinguish this eroded soil from Grenada silt loam, 2 to 6 percent slopes. Further erosion is a greater hazard because of the stronger slopes and more rapid surface runoff. Depth to the fragipan is less, so this soil has a shallower root zone and a lower moisture-supplying capacity. Organic-matter content is lower because of the subsoil material in the plow layer. This soil responds well to management and is suited to a wide range of crops.

Most of this soil is used for pasture or is cropped in a long rotation. Some small areas are wooded; others are idle. (Capability unit IIIe-8; woodland suitability group 9.)

Grenada silt loam, 6 to 12 percent slopes, severely eroded (GrC3).—Stronger slopes and a plow layer consisting almost entirely of subsoil distinguish this severely eroded soil from Grenada silt loam, 2 to 6 percent slopes. Depth to the fragipan is less, so this soil has a much lower

moisture-supplying capacity and a shallower root zone. Organic-matter content is very low, natural fertility is low, and workability is not so favorable because subsoil material is in the plow layer. Shallow gullies are present in some places, and further erosion is a greater hazard on this soil than on Grenada silt loam, 2 to 6 percent slopes. Response to management is only fair, and the range of crops is limited.

Much of this soil is used for pasture or is cropped in a long rotation. Some areas are idle. (Capability unit IVe-13; woodland suitability group 10.)

Gullied land (Gu). is a miscellaneous land type characterized by deep gullies and occurring largely where Memphis and Loring soils have been destroyed by erosion. Only small areas of the original soils remain between the gullies. Gullied land covers a small acreage in the bluff area and some very small, scattered areas where slopes originally ranged from 12 to 65 percent.

Gullied land is not suited to any type of farming and is idle or reverting to woods. Some small areas have been reclaimed by extensive land moving. (Capability unit VIIe-4; woodland suitability group 13.)

Henry Series

The Henry series consists of level to nearly level, poorly drained soils on stream terraces along Mud Creek and Little Bayou du Chien, and on small flats or depressions in the uplands near Fulton. These soils developed in thick loess and have a fragipan at a depth of 10 to 20 inches. The native vegetation is mainly oak, hickory, gum, and ash. The slope range is 0 to 2 percent.

Henry soils have a very dark gray and light brownish-gray silt loam surface layer, a gray silt loam subsoil, and a gray silt loam or silty clay loam fragipan.

These soils are strongly acid and low in content of organic matter and plant nutrients.

Henry soils are associated with Calloway and Grenada soils. They are more poorly drained than the Calloway and Grenada soils, and are grayer and more gleyed.

Excessive surface water limits the range of crops and ease with which Henry soils can be worked.

Henry silt loam (0 to 2 percent slopes) (Hn).—This poorly drained soil with a well-developed fragipan is on flats or depressions near Fulton.

Profile description:

- 0 to 1 inch, very dark grayish-brown, very friable silt loam.
- 1 to 5 inches, light brownish-gray to brown, very friable silt loam with gray mottles.
- 5 to 14 inches, gray, mottled with grayish brown or brown, very friable silt loam of weak blocky structure.
- 14 to 48 inches, gray, mottled with brown, brittle, compact silt loam or silty clay loam fragipan.
- 48 to 60 inches +, mottled yellowish-brown, friable, massive silt loam.

In cultivated areas the plow layer ranges from grayish brown to dark gray, with mottles of gray or brown. The last layer, in some places, is predominantly brownish. Depth to the last layer ranges from 42 to 52 inches. The thickness of this layer ranges from 20 to 50 feet, and in places the material is calcareous below a depth of 20 feet.

This strongly acid soil has moderately low natural fertility, favorable workability, and low organic-matter content. The root zone is shallow, and the moisture-supplying capacity is moderately low because the fragipan re-

stricts the depth to which roots can grow. Permeability is moderate down to the fragipan, and slow in the fragipan.

This soil responds slowly to management and is suited only to those crops that can grow under poor drainage. Nearly all of it is wooded. The part that has been cleared is mostly in permanent pasture. (Capability unit IVw-1; woodland suitability group 7.)

Henry silt loam, terrace (0 to 2 percent slopes) (Ht).—This soil is in depressions at lower levels than Henry silt loam. It is associated with the alluvial soils of the bottoms along Mud Creek and Bayou du Chien. At a depth of 30 inches or more, this soil is near neutral in reaction. Its fragipan is not quite so compact as that of Henry silt loam, and its potential for wood crop production is higher.

During very high floods the Mississippi River overflows areas of this soil on the lower reaches of Mud Creek, Bayou du Chien, and Little Bayou du Chien.

Nearly all of this soil is wooded. The part that has been cleared is now used for crops and pasture. (Capability unit IVw-1; woodland suitability group 6.)

Loring Series

The well drained to moderately well drained soils of the Loring series are in the thick loess of the sloping uplands. The native vegetation is chiefly oak, hickory, gum, and yellow-poplar. The slope range is 0 to 20 percent. These soils cover a large area in the county.

Where they have not been eroded, Loring soils have a brown silt loam surface soil and a brown silty clay loam subsoil. A brown, mottled fragipan is at a depth of 28 to 36 inches.

These soils are strongly acid and medium in content of organic matter and plant nutrients.

Loring soils are associated with Memphis and Grenada soils. They have poorer drainage than the Memphis soils but better drainage than Grenada soils. They have a browner and finer textured subsoil and a weaker fragipan than the Grenada soils.

Because they erode easily if not protected, Loring soils on strong slopes are not suited to extensive cultivation. The gentler slopes are used largely for cultivated crops, and the stronger slopes for pasture. Small areas are wooded.

Loring silt loam, 2 to 6 percent slopes (LnB).—This gently sloping, well drained to moderately well drained soil has a weak fragipan.

Profile description:

0 to 8 inches, brown, very friable silt loam.

8 to 32 inches, brown, firm silty clay loam; blocky structure.

32 to 48 inches, dark yellowish-brown, slightly compact, brittle silty clay loam fragipan with brown and light brownish-gray mottles; coarse blocky structure.

48 to 60 inches +, dark yellowish-brown, massive, friable silt loam with light brownish-gray mottles.

The plow layer ranges from brown to dark grayish brown. Depth to the fragipan ranges from 28 to 36 inches. The last layer ranges in thickness from 5 to 50 feet and, in places, is calcareous below a depth of 20 feet.

This strongly acid soil has moderate natural fertility, favorable workability, and medium organic-matter content. The root zone is deep to moderately deep, and the moisture-supplying capacity is high. The fragipan is at

such depth that it does not restrict root growth or moisture-holding capacity. Permeability is moderate down to the fragipan, and moderately slow in the fragipan. Erosion is a slight hazard.

This soil responds well to management and is suited to a wide range of crops. Practically all of it has been cleared and is used for crops and pasture. (Capability unit IIe-2; woodland suitability group 11.)

Loring silt loam, 0 to 2 percent slopes (LnA).—Less slope and slower surface runoff distinguish this soil from Loring silt loam, 2 to 6 percent slopes. Erosion is not a hazard, but during seasons of high rainfall drainage is a slight problem. This soil responds well to management and is suited to a wide range of crops.

Practically all of this soil has been cleared and is used for crops and pasture. (Capability unit I-3; woodland suitability group 11.)

Loring silt loam, 2 to 6 percent slopes, eroded (LnB2).—The plow layer of this eroded soil is a mixture of original surface soil and subsoil. The subsoil material in the plow layer causes the organic-matter content to be lower than in the corresponding layer of Loring silt loam, 2 to 6 percent slopes. Also, the depth to which roots can grow is slightly less because the fragipan is nearer the surface.

This soil responds well to management and is suited to a wide range of crops. (Capability unit IIe-2; woodland suitability group 11.)

Loring silt loam, 6 to 12 percent slopes, eroded (LnC2).—Stronger slopes and a plow layer that is a mixture of original surface soil and subsoil distinguish this eroded soil from Loring silt loam, 2 to 6 percent slopes. Further erosion is a greater hazard on this soil because its slopes are stronger and runoff is more rapid. Its organic-matter content is lower because subsoil material is in the plow layer. The root zone is shallower because the fragipan is nearer the surface.

This soil responds well to management and is suited to a wide range of crops. Most of it is used for crops or pasture. Some is wooded. (Capability unit IIIe-2; woodland suitability group 11.)

Loring silt loam, 12 to 20 percent slopes, eroded (LnD2).—The surface layer of this eroded soil is less than 5 inches thick and, in some places, is a mixture of original surface soil and subsoil. The organic-matter content is lower than in Loring silt loam, 2 to 6 percent slopes. The depth to the fragipan is less, and the depth of the root zone is therefore less. Response to management is good, but erosion is more of a hazard on this soil, and the range of crops is consequently more limited than on Loring silt loam, 2 to 6 percent slopes.

Most of this soil is wooded or in permanent pasture, but it is cropped occasionally in some areas. (Capability unit VIe-7; woodland suitability group 11.)

Loring silty clay loam, 2 to 6 percent slopes severely eroded (LoB3).—Because this soil is severely eroded, its plow layer consists almost entirely of subsoil material that is very low in organic-matter content. The moisture-supplying capacity and workability of this soil are less favorable than for Loring silt loam, 2 to 6 percent slopes, and surface runoff is more rapid.

This soil responds well to management and is used with the other gently sloping Loring soils. Erosion, however, limits the range of crops. (Capability unit IIIe-12; woodland suitability group 12.)

Loring silty clay loam, 6 to 12 percent slopes, severely eroded (LoC3).—The plow layer of this soil is mostly subsoil material and has a very low content of organic matter. Workability is less favorable than for Loring silt loam, 2 to 6 percent slopes. The hazard of erosion is greater because of stronger slopes and more rapid surface runoff. The fragipan is nearer the surface, so the moisture-supplying capacity is reduced and the depth to which roots can grow is less. The range of suited crops is not so wide, and the response to management is slow.

Most of this soil is used for pasture or is cropped in long rotations. Some is idle or reverting to woods. (Capability unit IVe-14; woodland suitability group 12.)

Loring silty clay loam, 12 to 20 percent slopes, severely eroded (LoD3).—This soil has stronger slopes and more rapid surface runoff than Loring silt loam, 2 to 6 percent slopes. Its moisture-supplying capacity is consequently lower, and the hazard of erosion is greater. The plow layer of this severely eroded soil consists almost entirely of subsoil material and therefore has low organic-matter content and less favorable workability than the plow layer of Loring silt loam, 2 to 6 percent slopes.

This soil is dissected by shallow gullies. It responds slowly to management, and its use for crops is restricted by the strong slopes and severe erosion. Most of it is used for permanent pasture. Some of it, however, is in second-growth woods, and some is idle. (Capability unit VIe-2; woodland suitability group 12.)

Made land (Ma) is a miscellaneous land type consisting of wide road fills or cuts, borrow pits, and other areas man has leveled or built during construction. No attempt was made to classify this land according to source of soil material or range in slope.

Memphis Series

In the Memphis series are well-drained soils on the sloping to steep sides and the gently sloping tops of loessial bluffs. The native vegetation is chiefly oak, hickory, and yellow-poplar. The slope range is 0 to 65 percent. These soils occupy a large area in the county.

In places where they have not been eroded, Memphis soils have a brown silt loam plow layer and a brown silty clay loam subsoil. Below this, at a depth of 45 inches, is the dark yellowish-brown parent material of silt loam texture.

These soils are strongly acid and medium in content of organic matter and plant nutrients.

Memphis soils are associated with Loring and Grenada soils. They are better drained than the Loring and Grenada soils, have a browner mottle-free subsoil, and have no fragipan.

Because Memphis soils are highly erosive, the gentler slopes are used largely as rotation cropland, the stronger slopes for pasture, and the steep slopes almost entirely as woodland. A small acreage is idle.

Memphis silt loam, 2 to 6 percent slopes (MmB).—This very deep, well-drained soil is on the sloping uplands.

Profile description:

0 to 8 inches, brown, very friable silt loam.

8 to 45 inches, brown, firm silty clay loam of blocky structure.

45 to 60 inches +, dark yellowish-brown, massive, friable silt loam with mottles of light brownish gray.

The plow layer ranges from brown to dark brown, and the subsoil from reddish brown to dark yellowish brown. The last layer ranges from 5 to 50 feet in thickness and, in places, is calcareous below a depth of 20 feet.

This strongly acid soil has a deep root zone, very high moisture-supplying capacity, moderate natural fertility, favorable workability, and medium organic-matter content. Permeability is moderate throughout. Erosion is only a slight hazard.

This soil responds well to management and is suited to a wide range of crops. Practically all of it has been cleared and is used for crops and pasture. (Capability unit IIe-2; woodland suitability group 11.)

Memphis silt loam, 0 to 2 percent slopes (MmA).—Surface runoff is slower on this nearly level soil than it is on Memphis silt loam, 2 to 6 percent slopes. Consequently, erosion is not a hazard. All of this soil has been cleared and is used for crops and pasture. (Capability unit I-3; woodland suitability group 11.)

Memphis silt loam, 2 to 6 percent slopes, eroded (MmB2).—This soil has lost some of its original surface layer through erosion. The plow layer consists of the original surface soil mixed with the upper part of the subsoil and, therefore, the organic-matter content of this soil is lower than in Memphis silt loam, 0 to 2 percent slopes. All of this soil is used for crops and pasture. (Capability unit IIe-2; woodland suitability group 11.)

Memphis silt loam, 6 to 12 percent slopes, eroded (MmC2).—Some of the original surface layer of this soil has been lost, so the plow layer extends into the subsoil. The organic-matter content, therefore, is lower than in Memphis silt loam, 2 to 6 percent slopes. Erosion is a greater hazard because of the stronger slopes and more rapid surface runoff. Nearly all of this soil has been cleared and is used for crops and pasture. (Capability unit IIIe-2; woodland suitability group 11.)

Memphis silt loam, 12 to 20 percent slopes, eroded (MmD2).—In some places the plow layer of this soil is thinner than that of Memphis silt loam, 2 to 6 percent slopes, and in others it is a mixture of original surface soil and subsoil. Erosion is a much greater hazard on this soil than on Memphis silt loam, 2 to 6 percent slopes, because this soil has stronger slopes and more rapid surface runoff. Most areas of this soil have been cultivated, but the greater part is now used for, and is best suited to, hay and pasture. Small areas remain in forest. (Capability unit VIe-7; woodland suitability group 11.)

Memphis silt loam, 30 to 65 percent slopes (MmF).—Practically all of this soil remains in forest. It is too steep and too erodible for cultivation. (Capability unit VIIe-1; woodland suitability group 11.)

Memphis silty clay loam, 6 to 12 percent slopes, severely eroded (MpC3).—Stronger slopes and a finer textured plow layer that consists almost entirely of former subsoil distinguish this soil from Memphis silt loam, 2 to 6 percent slopes. The organic-matter content is very low, and workability is not so favorable. Erosion is a hazard in this soil because of its strong slopes and rapid runoff. All of this soil has been cleared and is used for crops and pasture. Some small areas are idle or reverting to forest. (Capability unit IVe-9; woodland suitability group 12.)

Memphis silty clay loam, 12 to 20 percent slopes, severely eroded (MpD3).—In some places this soil has less than 2 inches of its original surface soil. In many places

the surface layer consists almost entirely of finer textured subsoil material. Organic-matter content is low, and workability is not favorable. Erosion is a hazard because of the strong slopes and runoff.

Most of this soil is used for hay and pasture, but it has been cropped in the past. Some areas are idle or reverting to forest. (Capability unit VIe-2; woodland suitability group 12.)

Memphis silty clay loam, 20 to 30 percent slopes, severely eroded (MpE3).—The plow layer of this soil extends well into the subsoil material. Workability is not so favorable as for Memphis silt loam, 2 to 6 percent slopes, and the organic-matter content is low. Because of the steep slopes and rapid runoff, erosion is a great hazard.

Much of this soil is used for permanent pasture, some is idle, and some is reverting to forest. Small areas of soils that are not severely eroded were mapped with this soil. (Capability unit VIe-2; woodland suitability group 12.)

Patton Series

In the Patton series are dark, level to nearly level soils on the flood plains of Mud Creek and Little Mud Creek. These soils formed in neutral silty alluvium under the influence of very poor drainage. More recently, their drainage has been improved by the streams that have cut through the flood plains. The native vegetation is chiefly water-tolerant oaks, gum, maple, and ash. Cottonwood has reseeded some open areas.

Patton soils have very dark grayish-brown or black silt loam in the surface layer. A layer of very dark gray silty clay loam begins at a depth of about 16 inches.

These soils are neutral in reaction and have a high content of organic matter and plant nutrients.

Patton soils are associated with the Birds and Wakeland soils. The Patton are much darker soils and have better profile development than the Birds and Wakeland.

Poor drainage limits the range of crops on Patton soils.

Patton silt loam (0 to 2 percent slopes) (Po).—This dark soil formed under very poor drainage.

Profile description:

- 0 to 16 inches, very dark grayish-brown or black, very friable silt loam.
- 16 to 32 inches, very dark gray, firm silty clay loam with blocky structure.
- 32 to 48 inches +, mottled grayish-brown and light olive-brown or yellowish-brown, friable, massive silt loam.

The second layer ranges from black to grayish brown and in places has light olive-brown mottles. A small area of a silt loam soil that has a clay subsoil was mapped with Patton silt loam.

This soil is neutral in reaction. It has a deep root zone, very high moisture-supplying capacity, favorable workability, moderately slow permeability, high natural fertility, and high organic-matter content. During seasons of high rainfall headwaters may overflow this soil for a short time. About every 4 years backwaters of the Mississippi River flood this soil on the lower reaches of Mud Creek for a period of 1 to 3 weeks.

When drained, this is highly productive soil and suited to all crops that do not require good drainage. (Capability unit IIw-5; woodland suitability group 2.)

Patton silt loam, overwash (0 to 2 percent slopes) (Po).—A 5- to 15-inch layer of recently deposited material distinguishes this soil from Patton silt loam. This layer is dark grayish-brown to dark yellowish-brown, very friable silt loam. It overlies a normal Patton soil. Natural fertility and organic-matter content are lower in this soil than in Patton silt loam. When drained, this soil is highly productive and suited to all crops that do not require good drainage. (Capability unit IIw-4; woodland suitability group 2.)

Riverwash, gravelly (Rg) is a miscellaneous land type made up of coarse gravel deposited by the Mississippi River on low elevations below the riverbank. Areas of this land are barren and will not support agriculture. They are of value for construction purposes only. (Capability unit VIIIs-4; woodland suitability group 13.)

Riverwash, sandy (Rh) is a miscellaneous land type that consists of coarse sandy alluvium deposited by the Mississippi River on low elevations below the riverbanks. It is essentially barren and has no agricultural value. Shifting of soil material during periods of high water is common, and mud deposits, 1 to 3 inches thick, have collected in some places. Areas of this land type are commonly referred to as bars. (Capability unit VIIIs-4; woodland suitability group 13.)

Robinsonville Series

Soils of the Robinsonville series are well drained to moderately well drained and were derived from Mississippi River alluvium deposited on natural levees. They occupy a large area on the river flood plain.

Robinsonville soils are very dark grayish-brown or dark grayish-brown silt loam, silty clay loam, or fine sandy loam to a depth of 24 inches. Below this there is brown fine sandy loam.

These soils are neutral to mildly alkaline in reaction; they are high in content of plant nutrients and moderate in content of organic matter.

Associated with the Robinsonville soils are the Commerce and Crevasse soils. The Robinsonville are better drained than the Commerce and have coarser textured underlying soil material that is not gray and gleyed. Robinsonville soils are finer textured and have darker colors than Crevasse soils, but are not so well drained. They lack the profile development of the Beulah, Bosket, and Dubbs soils.

The Robinsonville soils are suited to a wide range of crops. Practically all areas have been cleared.

Robinsonville silt loam (0 to 2 percent slopes) (Rn).—This well drained to moderately well drained soil was derived from Mississippi River alluvium deposited as natural levees along the river.

Profile description:

- 0 to 24 inches, very dark grayish-brown or dark grayish-brown, very friable silt loam.
- 24 to 48 inches +, brown or dark grayish-brown, very friable fine sandy loam.

Depth to the lower layer ranges from 12 to 36 inches. In places this layer consists of stratified fine sandy loam, silt loam, or silty clay loam.

This soil has a deep root zone, high moisture-supplying capacity, high natural fertility, favorable workability, moderate permeability to a depth of 2 feet, and rapid

permeability below that. It is high in organic-matter content. It responds well to management.

This soil is suitable for many crops, including alfalfa. In levee-protected areas, most of it has been cleared and is used continuously for row crops. In areas not protected by levees, some of the soil is still wooded. All unprotected areas are subject to occasional overflows of long duration, especially in spring. (Capability unit I-1; woodland suitability group 8.)

Robinsonville fine sandy loam (0 to 2 percent slopes) (Rm).—This soil is coarser textured than Robinsonville silt loam, has a slightly lower moisture-supplying capacity, and has more rapid permeability. Most of this soil has been cleared and is used continuously for row crops. (Capability unit I-1; woodland suitability group 8.)

Robinsonville silty clay loam (0 to 2 percent slopes) (Ro).—This soil is finer textured than Robinsonville silt loam, has less favorable workability, and has slower permeability. None of this soil is protected by levees. Most of it has been cleared and is used continuously for row crops. (Capability unit II_s-3; woodland suitability group 8.)

Sharkey Series

In the Sharkey series are level, poorly drained soils on the broad flats of the Mississippi River flood plain. They developed from fine-textured alluvium in the slack-water areas along the river. These soils cover a large area in the county.

The plow layer of the Sharkey soils is very dark grayish-brown silty clay or clay. The second layer is very dark gray or dark gray clay and extends to a depth of 3 feet or more.

These soils are neutral to mildly alkaline in reaction and have a high content of plant nutrients and organic matter.

Associated with the Sharkey soils are the Forestdale and Tunica soils. The Sharkey soils developed in thicker clay beds than the Tunica, and are more mottled and more poorly drained. They differ from the Forestdale soils in having a thicker clay bed and darker colors, and in lacking profile development.

The range of crops that can be grown on Sharkey soils is limited by poor drainage, unfavorable workability, and a moderately deep root zone.

Sharkey clay (0 to 1 percent slopes) (Sh).—This poorly drained clayey soil was derived from alluvium in slack-water areas along the Mississippi River.

Profile description:

- 0 to 8 inches, very dark grayish-brown, firm, sticky clay or silty clay with granular structure.
- 8 to 30 inches, very dark gray or dark gray, very firm, sticky clay with brown mottles; weak blocky structure.
- 30 to 60 inches +, gray, very firm, massive, very sticky clay with brown mottles.

In some places there is a traffic pan in the lower half of the plow layer, and in places the clay layers are underlain by coarser material at a depth of 3 feet or more.

This soil has unfavorable workability and slow permeability, but has high natural fertility and high organic-matter content. The root zone is only moderately deep because of the firm clay, and the moisture-supplying capacity is moderately high.

This soil is suited to crops that do not require good drainage. In levee-protected areas, most of this soil has been cleared and is used continuously for row crops. In areas not protected by levees, it is still wooded because frequent overflows of long duration prevent cultivation. (Capability unit IIIw-6; woodland suitability group 1.)

Sharkey silty clay loam, overwash (0 to 1 percent slopes) (So).—This soil has an overwash of silty clay loam 5 to 18 inches thick. It has more favorable workability than Sharkey clay, and permeability in the overwash layer is not quite so slow. (Capability unit IIIw-7; woodland suitability group 1.)

Swamp (Sw) is a miscellaneous land type on the flood plains of Bayou du Chien and the Mississippi River. No attempt was made to classify the soils because they are covered with water and inaccessible most of the time. Swamp is not suited to agriculture without extensive reclamation. Most of this land is covered with trees, mainly willow or cypress. (Capability unit VIIw-1; woodland suitability group 13.)

Tunica Series

The level, somewhat poorly drained soils of the Tunica series formed in fine-textured alluvium deposited by the Mississippi River. The native vegetation is chiefly bottom-land oaks, cottonwood, sweetgum, maple, and pecan. These soils cover a large area on the broad flats in the slack-water areas.

The plow layer of the Tunica soils is very dark grayish-brown silty clay or clay. It is underlain by dark grayish-brown or very dark grayish-brown clay that extends to a depth of 2½ feet. Below this there is a coarser textured soil material.

These soils are neutral in reaction and have a high content of organic matter and plant nutrients.

Tunica soils are associated with Sharkey and Forestdale soils. They are better drained than the Sharkey soils and developed in clay beds that were not so thick. The Tunica soils are better drained than the Forestdale soils and have less profile development.

Because of their high content of clay, these soils are difficult to work and the range of suitable crops is slightly limited.

Tunica clay (0 to 2 percent slopes) (Tu).—This is a somewhat poorly drained clayey soil derived from Mississippi River alluvium in the slack-water areas.

Profile description:

- 0 to 8 inches, very dark grayish-brown, very firm, sticky silty clay or clay.
- 8 to 32 inches, dark grayish-brown, very firm, sticky, massive clay with dark yellowish-brown mottles.
- 32 to 48 inches +, mottled grayish-brown and dark yellowish-brown, very friable, massive silt loam or fine sandy loam.

The depth to the last layer ranges from 20 to 36 inches. This layer, in places, consists of stratified fine sandy loam, silt loam, and silty clay loam.

This soil has a moderately deep root zone, high moisture-supplying capacity, high natural fertility, and high organic-matter content, but its workability is unfavorable. Permeability is slow through the clay layers and moderate to moderately rapid below them.

In levee-protected areas, nearly all of this soil has been cleared and is used continuously for row crops. In un-

protected areas it remains mostly in woods and is subject to overflows, especially in spring. (Capability unit IIIw-9; woodland suitability group 1.)

Wakeland Series

In the Wakeland series are level to nearly level, somewhat poorly drained soils derived from neutral silty alluvium. They cover a large area on the Mud Creek flood plain and on bottom lands in places closely associated with the bluffs.

The plow layer of the Wakeland soils is brown silt loam. The second layer is brown, mottled with gray, silt loam that extends to a depth of 15 inches. Below this there is silt loam, which is brownish gray or grayish brown, with yellowish-brown mottles.

Wakeland soils are nearly neutral in reaction; they are medium in content of organic matter and moderately high in content of plant nutrients.

Associated with the Wakeland soils are the Adler and Birds soils. The Wakeland soils have poorer drainage than Adler soils, and more mottling and grayish color nearer the surface. They have better drainage and a browner plow layer than the Birds soils, and are not so gray near the surface. Wakeland soils closely resemble Falaya soils but are neutral rather than strongly acid in reaction.

Excessive surface water and overflow are limitations, but with adequate drainage, Wakeland soils are suited to a wide range of crops.

Wakeland silt loam (0 to 2 percent slopes) (Wa).—This is a somewhat poorly drained soil derived from neutral, young silty alluvium.

Profile description:

- 0 to 8 inches, brown, very friable silt loam.
- 8 to 15 inches, brown, very friable silt loam with light brownish-gray mottles.
- 15 to 48 inches +, light brownish-gray, very friable, massive silt loam with yellowish-brown mottles.

The plow layer ranges from dark grayish brown to yellowish brown. In some places, the second layer is evenly mottled. The lower part of the last layer, in some places, is gray or dark gray mottled with brown. The reaction of this soil ranges from slightly acid to mildly alkaline.

This soil has a deep root zone, high moisture-supplying capacity, moderately high natural fertility, favorable workability, moderately rapid permeability, and medium organic-matter content.

During seasons of high rainfall this soil is subject to overflows of short duration, and early in spring the water table is often within a foot of the surface. Practically all of this soil has been cleared and is now used continuously for row crops. (Capability unit IIw-4; woodland suitability group 3.)

Waverly-Falaya Complex

In this complex the Waverly and Falaya soils are so closely associated that it is not practical to map them separately. These soils occupy a large area on the flood plain of Bayou du Chien and on the lower part of the flood plain of Little Bayou du Chien. The native vege-

tation is chiefly bottom-land oaks, hickory, and elm. Cottonwood has reforested some abandoned agricultural land.

The Waverly are poorly drained soils derived from silty alluvium. They have a grayish-brown silt loam surface layer that is underlain by gray silt loam.

The Falaya are nearly level, somewhat poorly drained soils, and they also were derived from silty alluvium. They have a brown silt loam surface layer underlain by a mottled brown and grayish-brown silt loam that extends to a depth of 15 inches. Below this, there is gray silt loam.

Waverly and Falaya soils are strongly acid and medium to low in content of organic matter and plant nutrients. They are grayer and have poorer drainage than the associated Collins soils.

Planting time and the range of crops on Waverly and Falaya soils are restricted because of poor drainage.

Waverly-Falaya silt loams (0 to 2 percent slopes) (WF).—These are poorly drained and somewhat poorly drained, closely associated soils derived from silty alluvium.

Profile description of Waverly silt loam:

- 0 to 3 inches, grayish-brown, very friable silt loam with brown mottles.
- 3 to 48 inches +, gray, very friable, massive silt loam with brown mottles.

The first layer is absent in some places. The last layer, in some areas, overlies firm silty clay loam at a depth of 40 inches.

Profile description of Falaya silt loam:

- 0 to 3 inches, brown, very friable silt loam.
- 3 to 14 inches, mottled brown and grayish-brown, very friable silt loam.
- 14 to 48 inches +, gray, very friable, massive silt loam with brown mottles.

In some places, the first layer of Waverly-Falaya silt loams is not present. The last layer, at a depth of about 40 inches, in some places overlies gray, mottled with brown, firm silty clay loam.

These strongly acid Waverly and Falaya soils have a deep root zone, very high moisture-supplying capacity, moderate natural fertility, moderate permeability, and medium organic-matter content. They respond to management, but drainage outlets usually are not adequate because the soils are in low or depressed areas. The range of suitable crops is therefore limited.

Most areas of Waverly-Falaya silt loams are wooded, but where they have been cleared they are used for crops and pasture. (Capability unit IIIw-5; woodland suitability group 3.)

Use of the Soils for Agriculture

The first part of this section is a general discussion of the soil problems of the county and applicable management practices. Following this, the capability classification system is explained. Then, the soils are placed in capability units and the relative suitability of the soils for growing different kinds of crops and the management they require for sustained high production are discussed. Finally, yields of crops and pasture are given for each soil under a defined, high level of management.

General Management

In Fulton County, controlling erosion, increasing fertility, and reducing wetness are the major management problems encountered in maintaining high yields.

Surface runoff on a soil that is not level must be controlled so that the soil is not washed away. Some of the ways by which runoff can be controlled are (1) including a sod crop in the rotation; (2) leaving crop residue on the surface; and (3) protecting the soils by contour tillage, by terraces, and by diversions and strip cropping.

The fertility of loessial soils varies according to past management practices. Normally, these soils have moderate to moderately low natural fertility. With the exception of a few soils on bottom lands, all loessial soils require lime and fertilizer to produce high yields and to provide large quantities of crop residue that can be turned under as a means of improving the soils. Since the amount of fertilizer and lime needed will differ according to the soil and the crop grown, recommendations are not given in this report. Detailed information about fertilizers, and other phases of soil management, however, can be obtained from the local staff of the Soil Conservation Service or from the Agricultural Experiment Station, Lexington, Ky.

Many soils of the Mississippi River flood plain do not need lime, and are high in content of phosphate and potash. Starter fertilizers help crops grow quickly and, thereby, make it easier to control weeds by allowing early cultivation. Nitrogen fertilizers are effective in obtaining high yields of crops other than legumes.

Many of the level or nearly level soils need to be drained to reduce wetness. Constructing tile or open ditch drainage systems, using diversions, and improving stream channels are effective ways of widening the range of crops that can be grown and of increasing yields.

Capability Groups of Soils

The capability classification is a grouping that shows, in a general way, how suitable soils are for most kinds of farming. It is a practical grouping based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels, the capability class, subclass, and unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes there can be up to four subclasses. The subclass is indicated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* means that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s*

shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the country, indicates that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *w*, *s*, and *c*, because the soils in it are susceptible to little or no erosion but have other limitations that limit their use largely to pasture, range, woodland, or wildlife.

Within the subclasses are the capability units, groups of soils enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally identified by numbers assigned locally, for example, IIe-2 or IIIe-2.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations; but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soil; and without consideration of possible but unlikely major reclamation projects.

The eight classes in the capability system, and the subclasses and units in Fulton County, are described in the list that follows.

Class I. Soils that have few limitations that restrict their use.

Capability unit I-1.—Nearly level, well drained to moderately well drained soils on bottom lands.

Capability unit I-2.—Nearly level, mostly moderately well drained soils on bottom lands.

Capability unit I-3.—Nearly level, well-drained to somewhat excessively drained soils on uplands and terraces.

Class II. Soils that have some limitations that reduce the choice of plants or require moderate conservation practices.

Subclass IIe. Soils subject to moderate erosion if they are not protected.

Capability unit IIe-2.—Gently sloping, well drained and moderately well drained (nearly well drained) soils on uplands.

Capability unit IIe-6.—Gently sloping, moderately well drained soils on uplands and terraces.

Subclass IIw. Soils that have moderate limitations because of excess water.

Capability unit IIw-2.—Nearly level, slightly wet soils on uplands and terraces; fragipan at a depth of about 2 feet.

Capability unit IIw-4.—Nearly level, somewhat poorly drained soils on flood plains.

Capability unit IIw-5.—Nearly level, poorly drained soils on low flood plains.

Subclass IIs. Soils that have moderate limitations of tilth.

Capability unit IIs-3.—Nearly level, well drained to moderately well drained soils on flood plains; somewhat difficult to work.

Class III. Soils that have severe limitations that reduce the choice of plants, or require special conservation practices, or both.

Subclass IIIe. Soils subject to severe erosion if they are cultivated and not protected.

Capability unit IIIe-2.—Deep, sloping, well drained to moderately well drained (nearly well drained) silty soils on uplands; eroded.

Capability unit IIIe-8.—Sloping, moderately well drained silty soils on uplands; eroded; fragipan at a depth of about 1½ feet.

Capability unit IIIe-11.—Gently sloping, moderately well drained silty soils on uplands; severely eroded; fragipan at a depth of about 15 inches.

Capability unit IIIe-12.—Gently sloping, moderately well drained to well drained soils on uplands; severely eroded; weak fragipan.

Subclass IIIw. Soils that have severe limitations because of excess water.

Capability unit IIIw-1.—Nearly level, somewhat poorly drained soils on uplands and terraces; well-developed fragipan.

Capability unit IIIw-3.—Gently sloping, somewhat poorly drained soils on uplands and terraces; fragipan.

Capability unit IIIw-5.—Nearly level, poorly drained silty soils on flood plains.

Capability unit IIIw-6.—Nearly level, poorly drained clayey soils on flood plains.

Capability unit IIIw-7.—Nearly level, poorly drained, moderately fine textured soils on flood plains.

Capability unit IIIw-9.—Nearly level, somewhat poorly drained soils on flood plains and terraces.

Subclass IIIIs. Soils that have severe limitations because of droughtiness.

Capability unit IIIIs-1.—Nearly level, somewhat excessively drained sandy soils on bottom lands.

Class IV. Soils that have very severe limitations that restrict the choice of plants, require very careful management, or both.

Subclass IVE. Soils subject to very severe erosion if they are cultivated and not protected.

Capability unit IVE-9.—Deep, sloping, well-drained silty soils on uplands; severely eroded.

Capability unit IVE-13.—Deep, sloping, moderately well drained soils on uplands; severely eroded; fragipan.

Capability unit IVE-14.—Sloping, moderately well drained to well drained soils on uplands; severely eroded; fragipan.

Subclass IVw. Soils that have very severe limitations for cultivation because of excess water.

Capability unit IVw-1.—Nearly level, poorly drained soils on uplands and terraces; fragipan at a depth of about 15 inches.

Class V. Soils not likely to erode that have other limitations, impractical to remove without major reclamation, that limit their use largely to pasture or range, woodland, or wildlife food and cover. (No class V soils in Fulton County.)

Class VI. Soils that have severe limitations that make them generally unsuitable for cultivation and that limit their use largely to pasture or range, woodland, or wildlife food and cover.

Subclass VIe. Soils severely limited, chiefly by risk of erosion if protective cover is not maintained.

Capability unit VIe-2.—Strongly sloping or moderately steep, well drained to moderately well drained soils on uplands; severely eroded.

Capability unit VIe-7.—Strongly sloping, moderately well drained to well drained soils on uplands; eroded.

Class VII. Soils that have very severe limitations that make them unsuitable for cultivation without major reclamation, and that restrict their use largely to grazing, woodland, or wildlife.

Subclass VIIe. Soils very severely limited, chiefly by risk of erosion if protective cover is not maintained.

Capability unit VIIe-1.—Steep to very steep, well-drained soils on uplands.

Capability unit VIIe-4.—Miscellaneous land types characterized by deep gullies.

Subclass VIIw. Soils very severely limited by excess water.

Capability unit VIIw-1.—Miscellaneous land types covered with water much of the time.

Subclass VIIIs. Soils very severely limited by moisture capacity.

Capability unit VIIIs-4.—Miscellaneous land types consisting of coarse gravel or coarse sandy alluvium.

Class VIII. Soils and landforms that have limitations that preclude their use, without major reclamation, for commercial production of plants; and restrict their use to recreation, wildlife, water supply, or esthetic purposes. (No class VIII soils in Fulton County.)

Management by Capability Units

Soils that are in the same capability unit have about the same limitations and similar risk of damage. The soils in any one unit, therefore, need about the same kind of management. The capability units are described in the following pages. The soils in each unit are listed, and suitable crops and management for all the soils in the unit are suggested.

CAPABILITY UNIT I-1

In this unit are nearly level, well drained to moderately well drained, very friable soils on bottom lands. They have a deep root zone, high moisture-supplying capacity, high natural fertility, moderately high organic-matter content, and favorable workability. They are neutral to moderately alkaline in reaction. These soils are—

Robinsonville fine sandy loam.
Robinsonville silt loam.

These soils occupy about 7 percent of the county. About 75 percent of their area is protected by levees. Nearly every year, unprotected parts are flooded for a week or two early in spring. About 90 percent of their acreage is used continuously for row crops, and 2 percent for pasture. Approximately 8 percent is wooded.

The soils of this unit are well suited to all crops commonly grown in the county. The main crops are cotton, corn, soybeans, alfalfa, truck crops, and small grains. Alfalfa and small grains usually are not grown in areas not protected from floods.

Because they are valuable as cropland, these soils are not extensively used for pasture. They are, however, well suited to all locally grown grasses and legumes, including alfalfa, red clover, white clover, lespedeza, orchardgrass, fescue, ryegrass, and redtop. Bermudagrass, fescue, and white clover are the best pasture plants for areas not protected from floods.

Row crops can be grown continuously on these soils. Turning under cover crops and crop residues helps to maintain organic-matter content and to preserve good tilth. The content of phosphate and potash is high. Starter fertilizers are effective in obtaining high yields. Crops other than legumes respond to liberal applications of nitrogen.

Soils of this unit can be tilled throughout a wide range of moisture content. They dry out quickly and, except during long spells of wet weather, can be worked at some time during any month of the year.

Although they are not irrigated at present, these soils are suited to either row or sprinkler irrigation because they are nearly level and have a high infiltration rate and high moisture-holding capacity. Neither erosion control nor drainage is needed.

CAPABILITY UNIT I-2

This unit consists of nearly level, very friable, mostly moderately well drained soils on bottom lands. They have a deep root zone, high moisture-supplying capacity, and favorable workability. These soils are—

Adler silt loam.
Collins silt loam.
Commerce silt loam.

Commerce silt loam is moderately well drained to somewhat poorly drained. Adler silt loam and Commerce silt loam have high natural fertility and are near neutral in reaction. Collins silt loam has moderate natural fertility and is strongly acid.

These soils occupy about 8.5 percent of the county. About 90 percent of their area is used for row crops, and 5 percent for pasture. Approximately 4 percent is used as woodland, and 1 percent is used for other purposes.

The soils of this unit are well suited to corn, soybeans, cotton, alfalfa, small grains, truck crops, and other crops commonly grown in the county. If water from the hills is drained away or controlled, row crops can be planted early and good yields of alfalfa and small grains are possible. Some of the suitable plants for hay and pasture are alfalfa, red clover, white clover, orchardgrass, tall fescue, and redtop.

Row crops can be grown continuously on these soils. Turning under both cover crops and crop residues helps to maintain organic-matter content and to preserve good tilth.

On Commerce silt loam and Adler silt loam, all crops respond to starter fertilizers, and crops other than legumes respond to liberal applications of nitrogen. On Collins silt loam, all crops respond to fairly large applications of phosphate and potash, and legumes need lime.

Soils of this unit can be tilled throughout a wide range of moisture content. Although irrigation is not now used, either sprinkler or row irrigation is feasible because these soils have a high infiltration rate and high moisture-holding capacity.

CAPABILITY UNIT I-3

In this unit are nearly level, well-drained to somewhat excessively drained soils on uplands and terraces. These are very friable soils. They have a deep root zone, high moisture-supplying capacity, moderate to moderately high natural fertility, and favorable workability. These soils are—

Beulah fine sandy loam.
Bosket silt loam.
Dubbs silt loam.
Loring silt loam, 0 to 2 percent slopes.
Memphis silt loam, 0 to 2 percent slopes.

These soils occupy about 1.5 percent of the county. About 85 percent of their acreage is used for crops, and 10 percent for pasture. Approximately 5 percent is wooded.

The soils of this unit are suited to all crops commonly grown in the county. The main crops are cotton, corn, soybeans, small grains, alfalfa, and truck crops. Some of the suitable plants for hay and pasture are alfalfa, red clover, white clover, lespedeza, orchardgrass, tall fescue, and redtop.

Row crops can be grown continuously on these soils. Turning under cover crops and crop residues helps to maintain the organic-matter content and to preserve good tilth.

Crops on these soils respond to fairly large applications of phosphate and potash. Alfalfa and similar legumes need lime. Nonleguminous crops respond to liberal applications of nitrogen.

Soils of this unit can be tilled throughout a wide range of moisture content. The Loring soil, however, dries out slowly after wet weather. Irrigation is not used, but it would be feasible because these soils have a high infiltration rate and high moisture-supplying capacity.

CAPABILITY UNIT IIe-2

Gently sloping, well drained and moderately well drained (nearly well drained) soils on uplands make up this unit. They have moderate natural fertility and favorable workability. These soils are—

Loring silt loam, 2 to 6 percent slopes.
Loring silt loam, 2 to 6 percent slopes, eroded.
Memphis silt loam, 2 to 6 percent slopes.
Memphis silt loam, 2 to 6 percent slopes, eroded.

The Loring soils have a high moisture-supplying capacity, but their root zone is restricted by a weak fragipan about $2\frac{1}{2}$ feet below the surface. The Memphis soils have a very high moisture-supplying capacity and a deep root zone. The eroded Memphis and Loring soils are low in organic-matter content.

The soils of this unit occupy about 11.5 percent of the county. About 65 percent of their acreage is used for row crops, and 28 percent for pasture. Approximately 5 percent is used as woodland, and 2 percent is used for other purposes.

These soils are suited to all crops commonly grown in the county. The chief crops are corn, cotton, soybeans,

small grains, and truck crops. Some of the suitable hay and pasture plants are red clover, white clover, lespedeza, orchardgrass, tall fescue, and redtop. Alfalfa grows well, but during wet seasons some losses can be expected on the Loring soils.

The erosion hazard, though moderately low, is the chief limitation when these soils are cropped. Erosion can be controlled effectively if row crops are grown not more than 1 year out of 2 or 3 years; if adequately fertilized sod crops are included in the rotation; and if the soils are protected by contour tillage and vegetated waterways.

The following is a suitable rotation: first year, plant corn and either seed a cover crop early or leave cornstalks on the surface; second year, plant corn and seed a cover crop early; third year, seed clover in spring for hay or pasture; fourth year, hay or pasture. Where slopes are long, this rotation will control erosion more effectively if strip cropping or terracing is used.

Crops on these soils respond to fairly large applications of phosphate and potash. Legumes need lime. Crops other than legumes respond to liberal applications of nitrogen.

Irrigation is not now used, but sprinkler irrigation would be feasible because these soils have an adequate infiltration rate and suitable moisture-holding capacity.

CAPABILITY UNIT IIe-6

The gently sloping, moderately well drained soils of this unit are on uplands and terraces. A fragipan about 2 feet below the surface restricts the depth to which roots can grow; the root zone is only moderately deep. The moisture-supplying capacity of these soils is moderately high, natural fertility is moderately low, and workability is favorable. These soils are—

Grenada silt loam, 2 to 6 percent slopes.

Grenada silt loam, 2 to 6 percent slopes, eroded.

The soils of this unit occupy about 8 percent of the county. About 65 percent of their acreage is used for row crops, and 30 percent for pasture. Approximately 4 percent is wooded, and 1 percent is used for other purposes.

These soils are fairly well suited to locally grown crops such as corn, cotton, soybeans, and small grains. Some suitable hay and pasture plants are orchardgrass, tall fescue, red clover, white clover, lespedeza, and redtop. Alfalfa is suitable for about 2 years, but wetness during winter limits the life of the stands.

Erosion is the chief limitation when these soils are cultivated. Erosion can be controlled effectively if row crops are grown not more than 1 year out of 3 years; if adequately fertilized sod crops are included in the rotation; and if the soils are protected by contour tillage and vegetated waterways.

The following is a suitable rotation: first year, plant corn and in the fall seed a small grain and grass in the corn stubble; second year, seed red clover in the small grain in spring; third year, meadow. Where slopes are long, this rotation will control erosion more effectively if strip cropping or terracing is used.

These soils are moderately low in content of plant nutrients. The eroded soil is low in content of organic matter. Crops on these soils respond to fairly large applications of phosphate and potash. Legumes need lime. Crops other than legumes respond well to nitrogen.

In spring, rain creates a slight drainage problem because these soils have a fragipan that restricts the downward movement of water. Late in summer, these soils are slightly droughty.

Irrigation is not now used, but sprinkler irrigation would be feasible because these soils have an adequate infiltration rate and suitable moisture-holding capacity.

CAPABILITY UNIT IIw-2

Grenada silt loam, 0 to 2 percent slopes, is the only soil in this unit. It is a slightly wet, nearly level soil on uplands and terraces. A fragipan about 2 feet below the surface restricts the depth to which roots can grow. The moisture-supplying capacity is moderately high, natural fertility is moderately low, and workability is favorable.

This soil occupies about 1 percent of the county. About 70 percent of its acreage is used for row crops, and 27 percent for pasture. Approximately 2 percent is used as woodland, and 1 percent is used for other purposes.

Corn and soybeans are suitable crops. In wet years, this soil does not dry out in time to plant cotton, and in the flat or pocketed areas, small grains drown out. Suitable plants for hay and pasture are tall fescue, redtop, red clover, white clover, and lespedeza.

Diversion ditches, land smoothing, or both, are effective in removing excess surface water. Tile drainage usually is not feasible.

This soil can be cropped in short rotations, such as the following: first year, plant corn and leave cornstalks on the surface; second year, plant corn and seed grass in the residue; third year, seed clover in the grass in spring, cut no hay, and leave all residue on the surface to maintain organic-matter content and to preserve good tilth.

This slightly droughty soil has a moderate yield potential. Its content of plant nutrients is moderately low. Crops respond to fairly large applications of phosphate and potash. Legumes require lime. Nonleguminous crops respond to nitrogen.

CAPABILITY UNIT IIw-4

This unit consists of nearly level, somewhat poorly drained soils on the flood plains. They have a high moisture-supplying capacity, a deep root zone, and moderate to high natural fertility. These soils are—

Commerce silt loam, low.

Commerce silty clay loam, low.

Commerce silty clay loam.

Dundee silty clay loam.

Falaya silt loam.

Patton silt loam, overwash.

Wakeland silt loam.

The soils of silt loam texture have favorable workability. Those of silty clay loam texture have slightly unfavorable workability; they are difficult to work when wet or slightly dry.

These soils occupy about 12 percent of the county. About 60 percent of their area is used for row crops, and 15 percent for pasture. Approximately 23 percent is wooded, and 2 percent is used for other purposes.

Corn and soybeans are suitable crops. Cotton is suitable if the soils are adequately drained. Some suitable hay and pasture plants are red clover, white clover, lespedeza, tall fescue, and redtop. Alfalfa is grown on the Dundee soil where surface drainage is adequate.

Row crops can be grown continuously on these soils. If they are adequately drained and smoothed, and if the water from the hills is controlled, crops can be planted early and good yields are possible. Turning under both cover crops and crop residues helps to maintain organic-matter content and to preserve good tilth.

On Commerce and Patton soils, crops respond to starter fertilizers. On Dundee, Falaya, and Wakeland soils, crops respond to fairly large applications of phosphate and potash. Legumes require lime on Dundee and Falaya soils. Crops other than legumes respond to liberal applications of nitrogen.

The water table is near the surface during wet seasons, usually late in winter and early in spring. Also, during this time, areas not protected by levees are subject to overflows.

CAPABILITY UNIT IIw-5

Patton silt loam is the only soil in this unit. This is a low lying, poorly drained soil on the flood plains. It is near neutral in reaction. It has a deep root zone, high moisture-supplying capacity, high natural fertility, and favorable workability.

This soil occupies about 1 percent of the county. About 70 percent of its acreage is used for row crops, and 20 percent for pasture. Approximately 5 percent is used as woodland, and 5 percent is used for other purposes.

Corn and soybeans are suitable crops. Hay and pasture plants, such as red clover, white clover, lespedeza, tall fescue, and redtop, are also suitable.

Row crops can be grown continuously on this soil. Excellent yields are possible if drainage is adequate and if the water from the hills is controlled. Turning under both crop residues and cover crops helps to maintain organic-matter content and to preserve good tilth. All crops respond to starter fertilizers, and nonleguminous crops respond to liberal applications of nitrogen.

The water table is often at or near the surface late in winter and early in spring. Once in 2 or 3 years the area on the lower reaches of the creeks is flooded by Mississippi River backwaters for a week or more late in winter or early in spring. The area on the upper reaches is flooded for a few hours only.

CAPABILITY UNIT IIw-3

Robinsonville silty clay loam is the only soil in this unit. It is a well drained to moderately well drained soil of the bottom lands. It has a moderately fine textured surface layer. It is near neutral in reaction. It has a deep root zone, high moisture-supplying capacity, high natural fertility, and unfavorable workability when wet or slightly dry.

This soil occupies about one-fourth of 1 percent of the county. About 65 percent of its acreage is used for row crops, and 35 percent is wooded.

Corn, soybeans, and cotton are suitable crops. Small grains and alfalfa are also suitable but usually are not grown because most of the acreage is not protected by levees and, thus, is subject to overflow by the Mississippi River. For this reason also, pasture plants are not suitable and the area is not generally used for pasture. Bermudagrass, fescue, and white clover, however, could tolerate overflows of a week or more.

Row crops can be grown continuously on this soil. Turning under crop residues helps to maintain organic-matter content and to improve tilth. Crops respond to starter fertilizers. Nonleguminous crops respond to liberal applications of nitrogen.

Neither erosion control nor drainage is needed.

CAPABILITY UNIT IIIe-2

This unit consists of sloping, well drained to moderately well drained (nearly well drained) soils on uplands. The soils have a moderate susceptibility to erosion, high moisture-supplying capacity, a moderately deep to deep root zone, moderate natural fertility, low organic-matter content, and favorable workability. These soils are—

Loring silt loam, 6 to 12 percent slopes, eroded.
Memphis silt loam, 6 to 12 percent slopes, eroded.

At about 2½ feet below the surface, the Loring soil has a weak fragipan that limits slightly the depth of the root zone and the internal drainage.

The soils of this unit occupy about 2 percent of the county. About 45 percent of their acreage is used for row crops, and 43 percent for pasture. Approximately 10 percent is wooded, and 2 percent is used for other purposes.

These soils are well suited to all crops commonly grown in the county. The chief crops are corn, cotton, soybeans, small grains, alfalfa, and truck crops. Some suitable hay and pasture plants are alfalfa, red clover, white clover, lespedeza, orchardgrass, tall fescue, and redtop.

The moderate erosion hazard is the chief limitation when these soils are cropped. Erosion can be controlled effectively if row crops are grown not more than 1 year out of 3 or 4 years; if adequately fertilized sod crops are included in the rotation; and if the soils are protected by contour tillage and vegetated waterways.

The following is a suitable rotation: first year, plant corn and seed a small grain and grass in the fall; second year, sow clover in the small grain; third and fourth years, meadow. All crop residues should be left on the surface to build up organic matter, to maintain tilth, and to reduce erosion. Where slopes are long, this rotation will control erosion more effectively if strip cropping or terracing is used.

Crops on these soils respond to phosphate and potash. Legumes require lime. Crops other than legumes respond to liberal applications of nitrogen.

CAPABILITY UNIT IIIe-8

Grenada silt loam, 6 to 12 percent slopes, eroded, is the only soil in this unit. This is a sloping, moderately well drained soil on the uplands. It has a moderate erosion hazard, moderately low natural fertility, favorable workability, low content of organic matter, and high moisture-supplying capacity. The root zone is moderately deep to shallow because a fragipan about 1½ feet below the surface limits the depth to which roots can grow.

This soil occupies about 2 percent of the county. About 40 percent of its acreage is used for row crops, and 50 percent for pasture. About 8 percent is used as woodland, and 2 percent is used for other purposes.

This Grenada soil is fairly well suited to locally grown crops such as corn, soybeans, small grains, and cotton. It is suited to hay and pasture crops such as orchardgrass, tall fescue, redtop, red clover, white clover, and lespedeza.

Erosion is the chief limitation when this soil is row-cropped. Erosion can be controlled effectively if row crops are grown not more than 1 year out of 4 or 5 years; if adequately fertilized sod crops are included in the rotation; and if the soil is protected by contour tillage and vegetated waterways.

The following is a suitable rotation: first year, plant a row crop and in the fall seed a small grain and grass in the corn stubble; second year, seed clover in the small grain; third, fourth, and fifth years, pasture. Where slopes are long, this rotation will control erosion more effectively if strip cropping or terracing is used. Growing sod crops and leaving grain residues on the surface help to build up organic matter and to maintain tilth.

This soil is moderately low in content of plant nutrients. Crops respond to fairly large applications of phosphate and potash. Legumes require lime, and crops other than legumes respond to nitrogen.

CAPABILITY UNIT IIIe-11

Grenada silt loam, 2 to 6 percent slopes, severely eroded, is the only soil in this unit. This is a gently sloping, moderately well drained soil on the uplands. It has a fragipan at a depth of about 15 inches; the root zone, consequently, is shallow. The moisture-supplying capacity is moderately low, and natural fertility is low. Because the plow layer of this severely eroded soil consists almost entirely of former subsoil, the content of organic matter is low and workability is only somewhat favorable.

This soil occupies about three-fourths of 1 percent of the county. About 50 percent of its acreage is used for row crops, and 35 percent for pasture. Approximately 5 percent is wooded, and 10 percent is used for other purposes.

This Grenada soil is best suited to small grains, hay, and pasture. Usually, it occurs with the soils in capability unit IIe-6, and with them is used for crops such as corn, soybeans, and cotton. Some of the more suitable hay and pasture plants are tall fescue, redtop, red clover, white clover, and lespedeza.

Erosion is the chief limitation when this soil is cropped. Erosion can be controlled effectively if row crops are grown not more than 1 year out of 4 or 5 years; if adequately fertilized sod crops are included in the rotation; and if the soil is protected by contour tillage and vegetated waterways.

The following is a suitable rotation: first year, plant corn and in the fall seed a small grain and grass in the corn stubble; second year, seed clover in the small grain; third, fourth, and fifth years, pasture.

This droughty soil has a moderately low yield potential. Special management is required to build up its content of organic matter and to improve its workability. Crops on this soil need phosphate and potash. Legumes need lime. Crops other than legumes respond to liberal applications of nitrogen.

CAPABILITY UNIT IIIe-12

Loring silty clay loam, 2 to 6 percent slopes, severely eroded, is the only soil in this unit. It is a gently sloping, moderately well drained to well drained soil on the uplands. It has a weak fragipan at a depth of about 2 feet. The root zone is moderately deep, the moisture-supplying capacity is moderately high, and natural fertility is moderately low. Because the plow layer of this severely eroded

soil consists almost entirely of former subsoil, the content of organic matter is very low and workability is slightly unfavorable.

This soil occupies about one-fourth of 1 percent of the county. Approximately 60 percent of its acreage is used for row crops, and 30 percent for pasture. About 5 percent is wooded, and 5 percent is used for other purposes.

This Loring soil is best suited to small grains, hay, and pasture. It is fairly well suited to corn, cotton, and soybeans, but yield potentials for these crops are moderately low. Some of the more suitable hay and pasture plants are alfalfa, red clover, white clover, lespedeza, orchard-grass, and fescue.

Erosion is the chief limitation when this soil is cropped. Erosion can be controlled effectively if row crops are grown not more than 1 year out of 4 years; if adequately fertilized sod crops are included in the rotation; and if the soil is protected by contour tillage and vegetated waterways.

The following is a suitable rotation: first year, plant corn and in the fall seed a small grain and grass in the corn stubble; second year, seed clover in the small grain; third and fourth years, pasture.

This soil has a moderately low yield potential. Special management is required to build up its content of organic matter and to improve its workability. Most crops respond to phosphate and potash. Legumes such as alfalfa and red clover require lime. Crops other than legumes respond to liberal applications of nitrogen.

CAPABILITY UNIT IIIw-1

The nearly level, somewhat poorly drained soils of this unit are on uplands and terraces. They have a fragipan at a depth of about 20 inches. They have a moderately high moisture-supplying capacity, a moderately deep root zone, moderately low natural fertility, a low content of organic matter, and favorable workability. These soils are—

Calloway silt loam, 0 to 2 percent slopes.
Calloway silt loam, terrace, 0 to 2 percent slopes.

These soils occupy about 3 percent of the county. About 50 percent of their area is used for row crops, and 25 percent for pasture. About 23 percent is wooded, and 2 percent is used for other purposes.

The soils of this unit are best suited to row crops such as soybeans, and they are fairly well suited to corn. They are best suited to hay and pasture plants such as white clover, lespedeza, alsike clover, tall fescue, and redtop.

Wetness and runoff from higher elevations are the main limitations. Diversion ditches and land smoothing are effective ways to remove excess surface water. Tile drainage usually is not feasible.

If row crops are grown not more than 1 year out of 2 or 3 years, the content of organic matter can be increased and good tilth can be maintained. The following is a suitable rotation: first year, plant soybeans and seed grass in the stubble after the last cultivation; second year, seed clover in spring for meadow or pasture; third year, meadow or pasture.

This soil has a moderately low yield potential. It is moderately low in content of plant nutrients. Crops on this soil respond to fairly large applications of phosphate and potash. Legumes require lime.

CAPABILITY UNIT IIIw-3

Gently sloping, somewhat poorly drained soils on uplands and terraces make up this unit. These soils have a moderately high moisture-supplying capacity, moderately low natural fertility, low content of organic matter, and favorable workability. A fragipan is about 20 inches below the surface; consequently, the root zone is only moderately deep. These soils are—

Calloway silt loam, 2 to 6 percent slopes.

Calloway silt loam, 2 to 6 percent slopes, eroded.

Calloway silt loam, terrace, 2 to 6 percent slopes.

These soils occupy about 3.5 percent of the county. About 50 percent of their acreage is used for row crops, and 38 percent for pasture. About 10 percent is wooded, and 2 percent is used for other purposes.

The soils of this unit are best suited to crops such as soybeans, and they are fairly well suited to corn. Among the suitable hay and pasture plants are red clover, white clover, lespedeza, alsike clover, tall fescue, and redtop.

Wetness and a moderate erosion hazard are the main limitations. Diversion ditches can help control runoff from higher elevations. Tile drainage is not feasible, nor is it necessary, because the excess surface water runs down the slopes. Erosion can be controlled effectively if row crops are grown not more than 1 year out of 2 or 3 years; if adequately fertilized sod crops are included in the rotation; and if the soils are protected by contour tillage and vegetated waterways.

The following is a suitable rotation: first year, plant soybeans and seed grass in the stubble after the last cultivation in the fall; second year, seed clover in spring for hay or pasture; third year, pasture. Where slopes are long, this rotation will control erosion more effectively if strip cropping or terracing is used.

These soils are moderately low in content of plant nutrients. Crops respond to fairly large applications of phosphate and potash. Legumes such as red clover and lespedeza need lime.

CAPABILITY UNIT IIIw-5

This unit consists of nearly level, poorly drained soils on bottom lands. They have a very high moisture-supplying capacity, a deep root zone, moderately low natural fertility, low content of organic matter, and favorable workability. These soils are—

Birds silt loam.

Waverly-Falaya silt loams.

These soils occupy about 4 percent of the county. About 20 percent of their area is used for row crops, and 10 percent for pasture. About 65 percent is wooded, and 5 percent is used for other purposes.

If adequately drained, these soils are suited to soybeans, corn, and similar row crops. Among the best suited hay and pasture plants are white clover, alsike clover, lespedeza, tall fescue, redtop, and reed canarygrass.

Wetness is the main limitation. Tile drainage, open-ditch drainage, and diversions to control water from higher elevations are required for good yields. The water table is often at or near the surface during much of the winter and spring.

Crops can be grown continuously on these soils. They are, nevertheless, moderately low in content of plant nu-

trients. Turning under crop residues helps to increase the content of organic matter and to maintain tilth. Turning under a summer green-manure crop 1 year out of 4 or 5 years is also helpful. Crops respond to fairly large applications of phosphate and potash. Legumes on Waverly-Falaya silt loams need lime.

Areas of these soils on the lower reaches of Bayou du Chien are flooded by headwaters and backwaters from the Mississippi River for 1 to 2 weeks late in winter and early in spring. During this time, areas on the upper reaches of Bayou du Chien are flooded for 1 to 3 days.

CAPABILITY UNIT IIIw-6

Sharkey clay, the only soil in this unit, is a poorly drained soil in slack-water areas on the Mississippi River bottom lands. It has a moderately high moisture-supplying capacity, a moderately deep to deep root zone, and high natural fertility, and, because it is clayey, it has unfavorable workability.

This soil occupies about 7 percent of the county. About 60 percent of its area is used for row crops, and 5 percent for pasture. About 35 percent is wooded and, for the most part, unprotected by levees.

Soybeans and corn are suitable crops. Hay and pasture crops such as white clover, alsike clover, red clover, lespedeza, fescue, redtop, and reed canarygrass are also suitable.

Wetness and unfavorable workability are the main limitations. The water table is often at or near the surface late in winter and early in spring. Either tile drainage or surface drainage is effective.

Row crops can be grown continuously on these soils. Turning under both crop residues and cover crops helps to improve tilth. Turning under a summer green-manure crop 1 year out of 4 or 5 years is also helpful. These soils are high in content of plant nutrients, but starter fertilizers are required for high yields. Crops other than legumes respond to liberal applications of nitrogen.

Nearly every year, areas not protected by levees are overflowed for 1 to 2 weeks early in spring.

CAPABILITY UNIT IIIw-7

Sharkey silty clay loam, overwash, is the only soil in this unit. It is a poorly drained soil in slack-water areas on bottom lands. On this soil an overwash of silty clay loam, 5 to 18 inches thick, overlies clay. This soil has a high moisture-supplying capacity, a moderately deep to deep root zone, high natural fertility, and slightly unfavorable workability.

This soil occupies about 1 percent of the county. About 70 percent of its acreage is used for row crops, and 5 percent for pasture. Approximately 25 percent is wooded.

Corn and soybeans are suitable crops. Hay and pasture plants such as white clover, alsike clover, red clover, lespedeza, fescue, redtop, and reed canarygrass are also suitable.

Wetness is the main limitation. The water table is often at or near the surface late in winter and early in spring. Either tile drainage or surface drainage is effective.

Crops can be grown continuously on these soils. Turning under cover crops and crop residues helps to maintain organic-matter content and to improve tilth. These soils are high in content of plant nutrients, but starter fertilizers are required for high yields. Crops other than legumes respond to liberal applications of nitrogen.

Areas not protected by levees are overflowed for 1 to 2 weeks nearly every spring.

CAPABILITY UNIT IIIw-9

This unit consists of somewhat poorly drained soils on bottom lands and terraces. These soils have a moderately high moisture-supplying capacity, a moderately deep to deep root zone, and moderately high to high natural fertility. Workability is somewhat unfavorable because of their clayey texture. These soils are underlain by coarse-textured material at a depth of 30 to 40 inches. These soils are—

Forestdale silty clay loam.
Tunica clay.

These soils occupy about 7 percent of the county. About 70 percent of their acreage is used for row crops, and 5 percent for pasture. Approximately 25 percent is wooded.

Corn and soybeans are suitable crops. Where surface drainage is adequate, cotton and alfalfa are also suitable. Red clover, white clover, alsike clover, lespedeza, fescue, and redtop are suitable plants for hay or pasture.

Wetness and unfavorable workability are the main limitations on these soils. The Forestdale soil is suited to tile drainage. Surface drainage and land smoothing are feasible on both soils. These soils are at higher elevations than the surrounding soils and, in places, their surface drainage is adequate.

These soils can be cropped continuously. They are moderately high in content of plant nutrients. Starter fertilizers are required, however, for high yields. Legumes on the Forestdale soil need some lime. Crops other than legumes respond to liberal applications of nitrogen. Turning under cover crops and crop residues helps to maintain organic-matter content and to improve tilth.

Areas not protected by levees are overflowed for 1 to 2 weeks nearly every spring.

CAPABILITY UNIT IIIb-1

Crevasse loamy fine sand, the only soil in this unit, is a somewhat excessively drained soil on bottom lands. Its moisture-supplying capacity is moderately low and its workability is slightly unfavorable because of its high content of sand. It has a deep root zone, moderately low natural fertility, and low content of organic matter.

This soil occupies about 2 percent of the county. About 72 percent of its acreage is wooded. Approximately 15 percent is used for pasture, 10 percent for row crops, and 3 percent for other purposes.

Crevasse loamy fine sand is moderately droughty and not well suited to corn, soybeans, cotton, or other row crops commonly grown in the county. Early spring truck crops are suitable. In areas protected by levees, small grains are suitable. Pasture and hay plants such as ber-mudagrass, tall fescue, and sericea lespedeza are also suitable.

This soil is moderately low in content of plant nutrients. Frequent light applications of a complete fertilizer are more effective than infrequent heavy applications.

CAPABILITY UNIT IVe-9

Memphis silty clay loam, 6 to 12 percent slopes, severely eroded, is the only soil in this unit. It is a sloping, well-drained soil on the uplands. It has a moderate erosion

hazard, high moisture-supplying capacity, a deep root zone, and moderately low natural fertility. Because the plow layer consists almost entirely of subsoil, organic-matter content is very low and workability is slightly unfavorable.

This soil occupies about 1 percent of the county. About 35 percent of its acreage is used for row crops, and 55 percent for pasture. Approximately 5 percent is wooded, and 5 percent is used for other purposes.

This Memphis soil is fairly well suited to corn, soybeans, cotton, and other row crops commonly grown in the county. Yield potential, however, is moderately low. Small grains, and hay and pasture plants such as tall fescue, orchardgrass, red clover, lespedeza, and sericea lespedeza, are more suitable than row crops.

Erosion is the chief limitation when this soil is cropped. Erosion can be controlled effectively if row crops are grown not more than 1 year out of 4 or 5 years; if adequately fertilized sod crops are included in the rotation; and if the soil is protected by contour tillage and vegetated waterways.

The following is a suitable rotation: first year, plant corn and in the fall seed a small grain and grass in the corn stubble; second year, seed clover in the small grain; third, fourth, and fifth years, pasture. A more suitable rotation is hay or pasture followed by a small grain when the grass and clover in the meadow need reseeding.

This soil is moderately low in content of plant nutrients. Crops respond to fairly large applications of phosphate and potash. Legumes need lime, and crops other than legumes respond to liberal applications of nitrogen. Special management is necessary to build up the content of organic matter and to improve tilth.

CAPABILITY UNIT IVe-13

Grenada silt loam, 6 to 12 percent slopes, severely eroded, is the only soil in this unit. This is a sloping, moderately well drained soil on the uplands. It has a fragipan at a depth of about 15 inches; the root zone, consequently, is shallow. The erosion hazard is moderately high, natural fertility is low, and the moisture-supplying capacity is low. Because the plow layer consists almost entirely of former subsoil, the content of organic matter is very low and workability is slightly unfavorable.

This soil occupies about 2 percent of the county. About 20 percent of its acreage is used for row crops, and 75 percent for pasture. Approximately 2 percent is wooded, and 3 percent is used for other purposes.

Row crops such as corn, soybeans, and cotton are grown on this soil, but because it is droughty, its yield potential is low. It is best suited to small grains, hay, or pasture. Some suitable hay and pasture plants are tall fescue, redtop, bermudagrass, Korean lespedeza, and sericea lespedeza.

Erosion is the chief limitation when this soil is cropped. A suitable cropping system that will control erosion is hay or pasture followed by a small grain when the grass and clover need reseeding. If row crops are planted, they should not be grown more than 1 year out of 5 or 6 years; adequately fertilized sod crops should be included in the rotation; and the soil should be protected by vegetated waterways.

The following is a suitable rotation: first year, plant corn and in the fall seed a small grain and grass in the

corn stubble; second year, seed clover in the small grain; third, fourth, and fifth years, pasture.

This soil is low in content of phosphate, potash, and lime. Crops other than legumes respond to nitrogen. Special management is necessary to increase the content of organic matter and to improve tilth.

CAPABILITY UNIT IVe-14

Loring silty clay loam, 6 to 12 percent slopes, severely eroded, is the only soil in this unit. This is a sloping, moderately well drained to well drained soil on the uplands. It has a moderately deep root zone because a fragipan is about 2 feet below the surface. This soil has a moderately high moisture-supplying capacity and moderately low natural fertility. Because its plow layer consists almost entirely of subsoil, this soil has a very low content of organic matter and slightly unfavorable workability. The erosion hazard is moderately high.

This soil occupies about 4 percent of the county. About 30 percent of its acreage is used for row crops, and 50 percent for pasture. About 10 percent is wooded, and 10 percent is used for other purposes.

This Loring soil is fairly well suited to corn, soybeans, cotton, and other row crops commonly grown in the county. The yield potential, however, is moderately low. The soil is best suited to small grains, hay, or pasture. Some suitable hay and pasture plants are tall fescue, redtop, bermudagrass, red clover, Korean lespedeza, and sericea lespedeza.

Erosion is the chief limitation when this soil is cropped. A suitable cropping system that will control erosion is hay or pasture and a small grain grown once every 3 or 4 years. The small grain is seeded with grass in the fall, and clover overseeded in the wheat in spring. If row crops are needed, they should not be grown on this soil more than 1 year out of 5 or 6 years, and then only if the soil is protected by vegetated waterways and an adequately fertilized sod crop is included in the rotation.

This soil is moderately low in content of phosphate and potash. Legumes require lime. Crops other than legumes respond to nitrogen. Special management is needed to increase the content of organic matter and to improve tilth.

CAPABILITY UNIT IVw-1

Nearly level, poorly drained soils on uplands and terraces are in this unit. These soils have a fragipan at a depth of about 15 inches; the root zone, consequently, is shallow. The moisture-supplying capacity is moderately low, natural fertility is moderately low, content of organic matter is low, and workability is favorable. Hazard of wetness is severe, even though the soils are droughty in summer and fall. These soils are—

Henry silt loam.
Henry silt loam, terrace.

These soils occupy about 1 percent of the county. About 20 percent of their acreage is used for row crops, and 25 percent for pasture. Approximately 50 percent is wooded, and 5 percent is used for other purposes.

These Henry soils are best suited to pasture or hay plants such as tall fescue, redtop, reed canarygrass, white clover, and Kobe lespedeza. If adequately drained, they are fairly well suited to soybeans or corn, but the yield potential is low.

Land smoothing and diversion terraces are effective ways to remove excess surface water. In most places, tile drainage is not feasible.

Growing row crops not more than 1 year out of 3 or 4 years will help to increase the content of organic matter and to maintain tilth. The following is a suitable rotation: first year, plant soybeans and in the fall seed grass in the stubble; second year, seed clover in spring and use for late pasture or hay; third year, pasture or hay.

These soils are moderately low in content of plant nutrients. Fairly large applications of phosphate and potash are required for best yields and for pasture and meadow of high quality. Legumes on these soils need lime.

CAPABILITY UNIT VIe-2

This unit consists of strongly sloping or moderately steep, well drained to moderately well drained, severely eroded soils on the uplands. These soils have a high susceptibility to erosion, a moderately deep or deep root zone, a moderately high moisture-supplying capacity, and moderate natural fertility. Because their plow layer consists almost entirely of subsoil, these soils have a low content of organic matter and slightly unfavorable workability. They are strongly acid and slightly droughty; their yield potential for forage is moderately low. These soils are—

Loring silty clay loam, 12 to 20 percent slopes, severely eroded.
Memphis silty clay loam, 12 to 20 percent slopes, severely eroded.

Memphis silty clay loam, 20 to 30 percent slopes, severely eroded.

The Loring soil, which accounts for about one-fourth of the total acreage in this unit, has a weak fragipan about 24 inches below the surface.

The soils of this unit occupy about 3 percent of the county. About 60 percent of their acreage is used for pasture, and 20 percent for row crops. Approximately 10 percent is wooded, and 10 percent is used for other purposes.

These soils are suited to pasture, meadow, or woods. Some suitable hay and pasture plants are fescue, bermudagrass, redtop, Korean lespedeza, and sericea lespedeza. Small grains can be grown in the process of establishing pasture.

Fairly large applications of phosphate, potash, and lime are required for pasture or meadow of high quality. Pure stands of grass respond to nitrogen.

Deep, uncrossable gullies form quickly on these soils. They can be controlled by preventing overgrazing, maintaining fertility, and repairing and reseeding small gullies immediately.

The preparation of seedbeds is difficult because the surface layers consist almost entirely of former subsoil. Slope hampers the use of farm machinery but, if handled carefully, most machines can be used.

CAPABILITY UNIT VIe-7

In this unit are strongly sloping, moderately well drained to well drained, eroded soils of the uplands. These soils have a high erosion susceptibility, high moisture-supplying capacity, a moderately deep or deep root zone, moderately high natural fertility, and favorable workability. Their content of organic matter is low, and

their yield potential for forage is moderate. They are strongly acid. These soils are—

Loring silt loam, 12 to 20 percent slopes, eroded.
Memphis silt loam, 12 to 20 percent slopes, eroded.

The Loring soil, which makes up about one-half of the total acreage in this unit, has a weak fragipan about 27 inches below the surface.

The soils of this unit occupy about one-half of 1 percent of the county. About 40 percent of their area is wooded. Some 40 percent is used for pasture, 10 percent for row crops, and 10 percent for other purposes.

These soils are suited to pasture, meadow, or woods. Some suitable hay and pasture plants are tall fescue, red-top, bermudagrass, Kobe lespedeza, Korean lespedeza, and sericea lespedeza. If managed properly, orchardgrass and alfalfa can be grown. Small grains can be grown in the process of establishing pasture or meadow.

Fairly large applications of phosphate and potash are required to obtain pasture or meadow of high quality. Legumes need lime, and pure stands of grass respond to nitrogen.

CAPABILITY UNIT VIIe-1

Memphis silt loam, 30 to 65 percent slopes, is the only soil in this unit. It is a steep to very steep, well-drained soil of the uplands. It has high susceptibility to erosion, high moisture-supplying capacity, a deep root zone, and moderately high natural fertility.

This soil occupies about 2 percent of the county. About 85 percent of it is wooded, 10 percent is used for pasture, and 5 percent is used for other purposes.

This Memphis soil is best suited to woods, wildlife, or limited grazing. Steep slopes make the use of farm machinery hazardous, and therefore, maintenance of pasture is difficult. If good woodland management is provided, this soil will produce fast-growing trees of high quality.

CAPABILITY UNIT VIIe-4

Gullied land, a miscellaneous land type, is in this unit. This land is characterized by deep gullies and is associated with Memphis and Loring soils on slopes ranging from 12 to 65 percent.

Gullied land occupies about one-fourth of 1 percent of the county. It is not suited to any type of farming. About 90 percent of its acreage has reverted to woods, and 10 percent is idle.

This land type is best suited to woods. If livestock are fenced out, most areas will revert to woods rather quickly. Pine is the best species for planting. Some small areas have been reclaimed by extensive land moving and have been seeded to fescue and sericea lespedeza.

CAPABILITY UNIT VIIw-1

Swamp makes up this unit. This miscellaneous land type is covered with water much of the time.

It occupies about 1 percent of the county. Practically all of its area is wooded, mostly with willow or cypress.

Without extensive reclamation, Swamp is not suited to anything other than woods. In dry years, timber can be cut in some dried out areas.

CAPABILITY UNIT VIIe-4

Miscellaneous land types consisting of coarse gravel or coarse sandy alluvium make up this unit. They are adjacent to the Mississippi River, below the river banks.

Shifting of soil material by floods is common. These land types are—

Riverwash, gravelly.
Riverwash, sandy.

These land types occupy about 2 percent of the county. Except for a few small, scattered willow or cottonwood trees, they are essentially barren.

During most of the winter and spring, these land types are covered with water. They have no agricultural value. In accessible areas, they are a good source of sand and gravel.

Estimated Yields

Table 2 gives the estimated average acre yields of the principal crops on each of the soils in Fulton County under a high level of management. Gullied land; Made land; Riverwash, gravelly; Riverwash, sandy; and Swamp are not listed because they generally are not suited to crops.

A high level of management includes several or many of the following practices:

1. Choosing well-suited varieties for planting.
2. Using a proper rate of seeding, planting at the right time, and employing efficient methods in harvesting the crop.
3. Controlling weeds, insects, and diseases.
4. Applying fertilizer in amounts equal to or in excess of the current recommendations of the Kentucky Agricultural Experiment Station or equal to or in excess of the need shown by soil tests that are properly interpreted.
5. Applying adequate amounts of lime.
6. Draining naturally wet soils, where feasible.
7. Using a crop rotation that will help control erosion, maintain the structure of the soil, and add organic matter.
8. Applying appropriate conservation measures, such as sodding of waterways, contour tillage, terracing, and stripcropping.
9. Using a cover crop and crop residues to increase the supply of organic matter in the soil and to help control erosion.
10. Using good pasture management.

Use of the Soils for Woodland¹

Nearly all of the area that is now Fulton County was wooded when the first settlers came to this part of the State. The uplands supported white oak, black oak, yellow-poplar, black walnut, and similar desirable species. The lowlands supported mainly hardwoods, but also some cypress. The principal hardwoods included sweetgum, cottonwood, and many kinds of oak.

Now, the most desirable species and the best-formed trees have been removed, and an excess of less desirable species and many cull trees remains. A large area of forest still remains on the lowlands, but little of it receives adequate management. Small scattered areas of woodland remain on the uplands.

¹ E. A. OREN, woodland conservationist, and E. V. HUFFMAN, assistant State soil scientist, collaborated in writing this section.

TABLE 2.—*Estimated average yields per acre of the principal crops under high level of management*

[Absence of figure indicates soil is poorly suited to the crop or that data available are not sufficient for accurate estimate]

Soil	Corn	Cotton	Wheat	Soybeans	Alfalfa-grass	Red clover-grass ¹	Lespedeza	Pasture
Adler silt loam	Bu.	Lb.	Bu.	Bu.	Tons	Tons	Tons	Acre days per animal unit ²
Beulah fine sandy loam	95	750	30	40+	4	3	2	195
Birds silt loam	65	600	35	20	2.5			150
Bosket silt loam	50			30			1.5	150
Calloway silt loam, 0 to 2 percent slopes	75	700	35	30	3			175
Calloway silt loam, 2 to 6 percent slopes	50		15	25		1	1.5	150
Calloway silt loam, 2 to 6 percent slopes, eroded	60		20	25		2	1.5	165
Calloway silt loam, terrace, 0 to 2 percent slopes	35		15	15		1	1	130
Calloway silt loam, terrace, 2 to 6 percent slopes	60		20	30		1	1.5	160
Collins silt loam	90+		30	40+	4	3	2	195
Commerce silt loam	100+	900+	35	45+	4+	3+		195
Commerce silt loam, low	75	700		40				170
Commerce silty clay loam	85	800		40				170
Commerce silty clay loam, low	60	500		35				150
Crevasse loamy fine sand								100
Dubbs silt loam	85	800	40	40	4+	3		195
Dundee silty clay loam	85	800	30	40	3	2		195
Falaya silt loam	75		15	40		2	2	180
Forestdale silty clay loam	65	600		30	2	2		180
Grenada silt loam, 0 to 2 percent slopes	80	600	20	35	2	2	2	180
Grenada silt loam, 2 to 6 percent slopes	80	700	30	35	3	3	2	190
Grenada silt loam, 2 to 6 percent slopes, eroded	70	700	25	30	2	2	1.5	180
Grenada silt loam, 2 to 6 percent slopes, severely eroded	40	500	15	15		1	1	130
Grenada silt loam, 6 to 12 percent slopes, eroded	60	650	25	30	3.5	2	1.5	180
Grenada silt loam, 6 to 12 percent slopes, severely eroded	35	500	15	15		1	1	120
Henry silt loam	30			20				120
Henry silt loam, terrace	40			25				125
Loring silt loam, 0 to 2 percent slopes	85+	800	35	40	4	3	2	195
Loring silt loam, 2 to 6 percent slopes	85+	800	40	40	4	3	2	195
Loring silt loam, 2 to 6 percent slopes, eroded	75	800	35	35	3	2	2	180
Loring silt loam, 6 to 12 percent slopes, eroded	65	700	35	30	3	2	1.5	150
Loring silt loam, 12 to 20 percent slopes, eroded			20		2			130
Loring silty clay loam, 2 to 6 percent slopes, severely eroded	50	500	25	25	2	1.5	1	100
Loring silty clay loam, 6 to 12 percent slopes, severely eroded	40	500	20	20		1.5	1	100
Loring silty clay loam, 12 to 20 percent slopes, severely eroded			15				1	80
Memphis silt loam, 0 to 2 percent slopes	90+	850	40	40	4+	3	2	195
Memphis silt loam, 2 to 6 percent slopes	90	850	40	40	4+	3	2	195
Memphis silt loam, 2 to 6 percent slopes, eroded	80	800	35	35	3.5	2.5	2	180
Memphis silt loam, 6 to 12 percent slopes, eroded	70	750	35	30	3	2	1.5	150
Memphis silt loam, 12 to 20 percent slopes, eroded			25		2.5	1.5	1	130
Memphis silty clay loam, 30 to 65 percent slopes								110
Memphis silty clay loam, 6 to 12 percent slopes, severely eroded	40	500	25	20	1.5	1	1	
Memphis silty clay loam, 12 to 20 percent slopes, severely eroded			15				1	100
Memphis silty clay loam, 20 to 30 percent slopes, severely eroded			15				1	80
Patton silt loam	90+	700		40+		3	2	180
Patton silt loam, overwash	90+	700		40+		3	2	180
Robinsonville fine sandy loam	90+	850	40	40	4+	3		195
Robinsonville silt loam	100+	900+	40	45+	4+	3		195
Robinsonville silty clay loam	90	850		40				195
Sharkey clay	60	500		30				170
Sharkey silty clay loam, overwash	70	600		35				170
Tunica clay	70	700		35	3			180
Wakeland silt loam	80	700		40		3	2	195
Waverly-Falaya silt loams	40			20			1.5	120

¹ Yields are those to be expected in the second year.² The number of days 1 acre will support 1 animal unit (1 cow,

steer, or horse; or 5 hogs; or 7 sheep or goats) without injury to pasture.

³ Alfalfa is short lived on this soil.

In a few places, valuable timber is obtained by good management of upland hardwoods. Fairly good markets exist for woodland products. Pecan trees, in addition to providing valuable timber, produce profitable nut crops.

Damage to woodland by uncontrolled fires has been prevalent but has decreased during the past decade. Damage from livestock grazing is common in the small forests on uplands. There is no history of epidemic attacks by insects or of diseases that have destroyed forest stands. Yet, large losses are caused annually by insects that bore through or scar the tree bark. Oaks generally are the worst afflicted. Heart rot that began as a result of fire scars also causes some losses.

Woodland Suitability Grouping of Soils

The many soils in Fulton County differ, and these differences influence growth and management of trees. Data on the effect of soil differences on growth and management of trees were obtained by research and field study. Then, to present this material in a way easily comprehended, the soils were placed in 13 woodland suitability groups. Each group consists of soils that produce similar kinds of woodcrops, that need similar management, and that have about the same potential productivity. The 13 woodland suitability groups are listed in table 3 and described in the text.

The factors considered in placing each soil in a woodland group include (1) potential productivity for several important woodcrops, (2) species to favor in managing existing woodland, (3) species to favor in planting, and (4) critical soil-related hazards and limitations to be considered in woodland management. These interpretations are explained as follows:

Potential soil productivity was estimated after studying nearly 200 forest sites in Fulton County and in other locations having similar soils. Each site was selected to represent a specific kind of woodcrop growing on a recognized kind of soil. As nearly as possible, studies were confined to well-stocked, naturally occurring, even-aged, and unmanaged forest stands not adversely affected by fire, livestock grazing, insects, or disease. For some species, sites suitable for measurement could not be found on all the kinds of soil. In such instances, site index values were interpolated by using data on site index for similar soils.

Site index, for all trees except cottonwood and willow, is the average height of the species dominant in the stand at 50 years of age. For cottonwood and willow, an age of 30 years was used in determining site index.

Table 3 lists average site indexes for some of the important species on each of 12 woodland suitability groups. Woodland suitability group 13 consists of miscellaneous land types not suitable for planned production of woodcrops.

The average site indexes for species in woodland suitability groups 9, 10, 11, and 12 were converted to annual volume growth, by board feet and cords, in table 4. These conversions were made by reference to published research material on growth of yellow-poplar, upland oaks, loblolly pine, and shortleaf pine (6, 12, 15).² Such conversions

of average site index could not be made for other woodland suitability groups because sufficient research on volume growth for the species growing on the soils of these groups is not available.

Research indicates, however, that site index for cottonwood, sweetgum, and red oak growing on lowlands can be interpreted in terms of volume growth about as follows (9): Soils having a site index of 100 or more for cottonwood have an annual production potential of 770 board feet per acre. To get this production, several intermediate harvests are followed by a final harvest when the cottonwood trees are 45 years old and average about 34 inches in diameter at breast height.

Soils that have a site index of 90 or more for red oaks (mainly pin, cherrybark, and Shumard oaks) have potential production of 520 board feet per acre annually. This potential is based on intermediate harvests and a final harvest when the trees are 80 years old and average about 38 inches in diameter at breast height.

Soils that have a site index of 90 or more for sweetgum have a potential production averaging 360 board feet per acre annually. This is based on several intermediate harvests and a final harvest when the trees are 96 years old and average about 34 inches in diameter at breast height.

Where the site index for sweetgum and red oak is below 90, or where the site index is below 100 for cottonwood, yields lower than those just given can be expected. Some exceptional areas in this county will yield 1,000 board feet of cottonwood per acre, annually.

Species to favor in existing woodland are listed according to priority in table 3. The factors that work together to determine priority are site index, quality of tree, and density of growth in natural stands. The species first listed in table 3, and those that follow in decreasing order of desirability, are the trees to favor in weeding, improvement cutting, and similar woodland management.

Species preferred for planting are listed in table 3 in order of preference, the most desirable first. The order of preference is based on experience. Cottonwood, generally, is the best tree to plant in open fields on lowlands, and pine is best in open fields on uplands.

Soil-related hazards and limitations to be considered in woodland management are plant competition, equipment limitations, hazard of gully erosion, and seedling mortality. These hazards and limitations are listed in table 3 and described in the discussion of each woodland suitability group.

WOODLAND SUITABILITY GROUP 1

This group consists of poorly drained, clayey soils of the slack-water areas on bottom lands. These soils are—

Sharkey silty clay loam, overwash (So).
Sharkey clay (Sh).
Tunica clay (Tu).

The potential productivity of suitable trees on these soils is moderately high and justifies intensive management. The site index for pin oak is slightly higher in areas protected by levees than in unprotected areas. In some small areas where, apparently, adjacent topography contributes to the above-average moisture during the growing season, the site index for cottonwood is as high as 120.

² Italic numbers in parentheses refer to Literature Cited, page 68.

TABLE 3.—*Woodland suitability groups of soils*

Woodland suitability group	Potential soil productivity (site index)	Preferred species for		Critical management factors
		Existing woodland	Planting on open land	
1. Poorly drained, clayey soils of slack-water areas on bottom lands.	Pin oak: 85 to 95. Overcup oak: 80 to 90. Cottonwood: 90 to 100. Sweetgum: 90 to 95. Black willow: 76.	Cottonwood, pin oak, pecan, sweetgum, sycamore, silver maple, and willow.	Cottonwood, pecan, pin oak, sweetgum, and bald cypress.	Equipment limitations; plant competition.
2. Poorly drained, medium-textured soils on terraces.	Pin oak: 85 to 90. Overcup oak: 86. Cottonwood: 90 to 100. Black willow: 78.	Cottonwood, pin oak, sweetgum, sycamore, and silver maple.	Cottonwood, pecan, pin oak, sweetgum, and bald cypress.	Equipment limitations; plant competition.
3. Somewhat poorly drained to poorly drained, silty soils on loessal bottom lands.	Pin oak: 106±5. Cherrybark oak: 102±3. Shumard oak: 115. Cottonwood: 105±5. Sweetgum: 101.	Cherrybark oak, Shumard oak, cottonwood, pin oak, and sweetgum.	Cottonwood, cherrybark oak, Shumard oak, pecan, pin oak, sweetgum, and bald cypress.	Equipment limitations; plant competition.
4. Somewhat poorly drained, clayey or silty soils on low terraces or bottom lands.	Cottonwood: 116±6. Sweetgum: 107. Pin oak: 100 to 110.	Cottonwood, pin oak, and sweetgum.	Cottonwood, pecan, pin oak, and sweetgum.	Equipment limitations; plant competition.
5. Excessively drained, sandy soils on bottom lands.	Cottonwood: 82±5.	Cottonwood.	Cottonwood.	Equipment limitations; plant competition.
6. Somewhat poorly drained to poorly drained, nearly level soils on stream terraces.	Cherrybark oak: 104. Pin oak: 95. Shumard oak: 93±6. Cottonwood: 98±3. Sweetgum: 101±10.	Cherrybark oak, cottonwood, sweetgum, Shumard oak, and pin oak.	Cottonwood, sweetgum, cherrybark oak, Shumard oak, and pin oak.	Equipment limitations; plant competition.
7. Somewhat poorly drained to poorly drained, nearly level, silty soils on uplands; fragipan.	Shumard oak: 79±5. Sweetgum: 83±4. Black oak: 77.	Shumard oak, black oak, sweetgum, and hickory.	Shumard oak and sweetgum.	Plant competition.
8. Well drained to moderately well drained, medium-textured soils on bottom lands and terraces.	Cottonwood: 110 to 120. Sweetgum: 100 to 110.	Cottonwood, cherrybark oak, Shumard oak, and sweetgum.	Cottonwood, cherrybark oak, Shumard oak, and sweetgum.	Plant competition.
9. Moderately well drained, nearly level to sloping soils on loessal uplands; fragipan; slightly to moderately eroded.	Yellow-poplar: 95. Upland oak: 70±3. Loblolly pine: 82. Shortleaf pine: 57.	Yellow-poplar, black oak, white oak, and southern red oak.	Loblolly pine, shortleaf pine, and white pine.	Plant competition.
10. Moderately well drained, gently sloping soils on loessal uplands; fragipan; severely eroded.	Loblolly pine: 78. Shortleaf pine: 52.	Black oak, southern red oak, and hickory.	Loblolly pine and shortleaf pine.	Hazard of gully erosion; seedling mortality.
11. Well-drained, nearly level to very steep soils on loessal uplands; slightly to moderately eroded.	Yellow-poplar: 99. Upland oak: 85. Loblolly pine: 79. Shortleaf pine: 75.	Yellow-poplar, white oak, black oak, southern red oak, and sweetgum.	Loblolly pine, shortleaf pine, white pine, black locust, black walnut, and yellow-poplar.	Hazard of gully erosion on slopes of more than 6 percent; equipment limitations on slopes of more than 12 percent; plant competition.
12. Well-drained, gently sloping to steep soils on loessal uplands; severely eroded.	Loblolly pine: 79. Shortleaf pine: 65.	Black oak, southern red oak, and hickory.	Loblolly pine, shortleaf pine, and white pine.	Hazard of gully erosion; equipment limitations; seedling mortality.
13. Miscellaneous land types: swamp, riverwash, gullied land, and graded land. (See discussion of woodland suitability group 13.)				

TABLE 4.—Estimated annual growth of fully stocked, unmanaged, even-aged stands of yellow-poplar, upland oak, loblolly pine, and shortleaf pine¹

YELLOW-POPLAR ²				
Woodland suitability group	Average site index	Average yearly volume growth per acre		
		Bd. ft., International rule	Bd. ft., Doyle rule	Rough cords
9	95	620	310	1.6
10				
11	99	680	340	1.8
12				
UPLAND OAK ³				
9	70	210	70	.6
10				
11	85	320	135	.8
12				
LOBLOLLY PINE ⁴				
9	82	550	290	1.3
10	78	500	250	1.3
11	79	510	260	1.3
12	79	510	260	1.3
SHORTLEAF PINE ⁴				
9	57	325	110	1.0
10	52	250	70	1.0
11	75	570	260	1.5
12	65	430	170	1.2

¹ To age 60 for board feet growth, and to age 35 for cords.

² Based on interpretation of data in USDA Tech. Bul. 356 (6).

³ Based on interpretation of data in USDA Tech. Bul. 560 (12).

⁴ Based on interpretation of data in USDA Misc. Pub. 50 (16).

Equipment limitations are severe because these soils are under water or wet for periods totaling more than 3 months in every year.

Plant competition is severe because abundant moisture is available early in the growing season. Shade-tolerant trees of low quality establish themselves in the understory of sawlog stands. When the overstory is removed by logging, these shade-tolerant trees usually prevent the satisfactory reestablishment of desirable trees unless the site is weeded intensively. Interplanting or conversion planting generally is not feasible because competition from the undesirable trees is severe. Trees planted in open fields usually require one or more cultivations.

WOODLAND SUITABILITY GROUP 2

In this group are poorly drained, medium-textured soils on terraces. These soils are—

Patton silt loam, overwash (Po).
Patton silt loam (Pa).

The potential productivity of suitable trees is high and justifies intensive management.

The limitations on the use of equipment are severe. The soils are flooded or wet for periods totaling 3 months or more every year.

Plant competition is severe. Shade-tolerant trees of low quality, aided by the abundant moisture available during the growing season, grow in the understory of sawlog stands. When the sawlog stands are cut, these shade-tolerant trees usually prevent successful natural regeneration of the desirable trees. Generally, it is necessary to prepare a site for planting and, after planting, to control the competing vegetation by intensive weeding. Because plant competition is severe, interplanting or conversion planting usually is not feasible. Trees planted in open fields, as a rule, require one or more cultivations.

WOODLAND SUITABILITY GROUP 3

This group consists of somewhat poorly drained to poorly drained, silty soils on bottom lands. These soils were derived from loess. They are—

Birds silt loam (Bd).
Falaya silt loam (Fc).
Wakeland silt loam (Wo).
Waverly-Falaya silt loams (Wi).

The potential productivity of suitable trees is high and justifies intensive management.

Equipment limitations are severe because these soils are under water or wet during periods totaling 3 months or more every year.

The abundant moisture available during the growing season helps to make plant competition severe. Shade-tolerant trees of low quality establish themselves in the understory of sawlog stands. Following logging of the stands, these shade-tolerant trees prevent the satisfactory reestablishment of desirable trees unless the site is weeded intensively. Interplanting or conversion planting generally is not feasible, because competition from undesirable vegetation is severe. Trees planted in open fields usually require one or more cultivations.

WOODLAND SUITABILITY GROUP 4

This group consists of somewhat poorly drained, clayey or silty soils on low terraces or bottom lands. These soils are—

Commerce silt loam, low (Co).
Commerce silty clay loam, low (Cs).
Forestdale silty clay loam (Fo).

The potential productivity of suitable trees is high and justifies intensive management.

Equipment limitations are severe because these soils are under water or wet for periods that total more than 3 months every year.

The abundant moisture available during the growing season helps to make plant competition severe after the overstory has been removed by logging. Shade-tolerant trees of low quality, growing in the understory of sawlog stands, usually prevent the satisfactory natural regeneration of desirable trees after the stands have been cut. Generally, it is necessary to prepare a site for planting and, after planting, to control the competing vegetation by intensive weeding. Interplanting or conversion planting usually is not feasible, as competition from undesirable vegetation is too great. Trees planted in open fields, as a rule, require one or more cultivations.

WOODLAND SUITABILITY GROUP 5

The one soil in this group, Crevasse loamy fine sand (Cv), is an excessively drained, sandy soil on the bottom lands.

The potential productivity of cottonwood trees on this soil is fair and justifies only a medium level of management.

This soil is flooded a total of 2 to 3 months out of the year. Limitations on the use of equipment are moderate.

Early in the growing season, sufficient moisture is available to cause moderate competition between cottonwood seedlings and herbaceous vegetation.

The seedling mortality rate for cottonwood is moderate. A spring drought lasting 3 weeks will cause some losses in newly planted or newly germinated cottonwoods.

WOODLAND SUITABILITY GROUP 6

Somewhat poorly drained to poorly drained, nearly level soils on stream terraces are in this group. These soils are—

Calloway silt loam, terrace, 0 to 2 percent slopes (CbA).
Calloway silt loam, terrace, 2 to 6 percent slopes (CbB).

Henry silt loam, terrace (Hn).

The potential productivity of suitable trees is high and justifies intensive management.

Equipment limitations are severe because these soils are under water or wet during periods totaling more than 3 months in every year.

Plant competition is severe because abundant moisture is available during the growing season. Shade-tolerant trees of low quality grow in the understory of sawlog stands. When the overstory is removed by logging, these shade-tolerant trees usually prevent the satisfactory reestablishment of desirable trees unless the site is weeded intensively. Interplanting or conversion planting generally is not feasible because there is severe competition from undesirable vegetation. Trees planted in open fields usually require one or more cultivations.

WOODLAND SUITABILITY GROUP 7

This group consists of somewhat poorly drained to poorly drained, nearly level silty soils on uplands. These soils have a fragipan. They are—

Calloway silt loam, 0 to 2 percent slopes (CaA).
Henry silt loam (Hn).

The potential productivity of suitable trees on these soils is moderately high and justifies intensive management.

The limitations on the use of equipment are moderate; the soils are wet for periods totaling about 2 months every year.

Plant competition is severe after the overstory has been cut. Shade-tolerant trees, aided by the abundant moisture available during the growing season, establish themselves in the understory of sawlog stands and, following the logging of the stands, prevent the successful natural regeneration of desirable trees. Where trees are planted, it is necessary to prepare the site for planting and to control competing vegetation by intensive weeding. Interplanting or conversion planting usually is not feasible because of competition from undesirable vegetation. Open fields planted to trees need one or more cultivations.

WOODLAND SUITABILITY GROUP 8

In this group are well drained to moderately well drained, medium-textured soils on bottom lands and terraces. These soils are—

Adler silt loam (Ad).
Beulah fine sandy loam (Bo).
Bosket silt loam (Bo).
Collins silt loam (Cc).
Commerce silt loam (Cm).
Commerce silty clay loam (Cr).
Dubbs silt loam (Db).
Dundee silty clay loam (Du).
Robinsonville fine sandy loam (Rm).
Robinsonville silt loam (Rn).
Robinsonville silty clay loam (Ro).

The potential productivity of suitable trees is high and justifies intensive management. These soils are best suited to trees that grow on bottom lands. Nevertheless, the better drained soils in this group can have a site index of as much as 82 for upland oaks, and of 110 for yellow-poplar.

Equipment limitations are moderate to severe during periods when the soils are wet. The Adler, Collins, and Commerce soils are very wet for periods totaling more than 3 months every year. The other soils in this group are wet for periods totaling approximately 2 months every year.

Plant competition is severe because abundant moisture is available during the growing season. Shade-tolerant trees of low quality establish themselves in the understory of sawlog stands. If their growth is not controlled by extensive weeding after the overstory is cut, these shade-tolerant trees usually prevent the successful natural regeneration of desirable trees. Interplanting or conversion planting generally is not feasible because of competition from undesirable trees. Trees planted in open fields usually require one or more cultivations.

WOODLAND SUITABILITY GROUP 9

This group is made up of moderately well drained, nearly level to sloping soils on loessial uplands. They have a fragipan and are slightly to moderately eroded. These soils are—

Calloway silt loam, 2 to 6 percent slopes (CoB).
Calloway silt loam, 2 to 6 percent slopes, eroded (CoB2).
Grenada silt loam, 0 to 2 percent slopes (GrA).
Grenada silt loam, 2 to 6 percent slopes (GrB).
Grenada silt loam, 2 to 6 percent slopes, eroded (GrB2).
Grenada silt loam, 6 to 12 percent slopes, eroded (GrC2).

The potential productivity of suitable trees is moderately high and justifies intensive management. Shortleaf pine produces some yield without intensive management.

A favorable supply of moisture during the growing season helps to make plant competition severe. Shade-tolerant trees of low quality usually grow in the understory of sawlog stands. When the overstory is removed by logging, these shade-tolerant trees prevent the satisfactory natural regeneration of desirable trees. To assure the dominance of a desirable woodcrop, one or more weedings are required. Interplanting or conversion planting generally is not feasible because competition from undesirable trees is severe. Usually there is severe competition to newly planted trees in open fields that have been abandoned as cropland or pasture for 2 years or more.

WOODLAND SUITABILITY GROUP 10

The moderately well drained, gently sloping soils in this group are on loessial uplands. They have a fragipan and are severely eroded. These soils are—

Grenada silt loam, 2 to 6 percent slopes, severely eroded (GrB3).
Grenada silt loam, 6 to 12 percent slopes, severely eroded (GrC3).

The potential productivity of loblolly pine is fair, and that of shortleaf pine is low. A medium level of management is justified.

Excess water readily forms gullies in these soils. For this reason, roads and skid trails must be carefully located, built, and maintained.

Seedling mortality is moderately severe during periods of drought, which occur in the early part of some growing seasons and last 2 to 3 weeks. These dry periods cause moderate to severe losses of newly planted trees. Generally, seedlings volunteer in cutover areas and slowly establish effective cover.

WOODLAND SUITABILITY GROUP 11

This group consists of well-drained, nearly level to very steep soils on loessial uplands. These soils are slightly to moderately eroded. They are—

Loring silt loam, 0 to 2 percent slopes (LnA).
Loring silt loam, 2 to 6 percent slopes (LnB).
Loring silt loam, 2 to 6 percent slopes, eroded (LnB2).
Loring silt loam, 6 to 12 percent slopes, eroded (LnC2).
Loring silt loam, 12 to 20 percent slopes, eroded (LnD2).
Memphis silt loam, 0 to 2 percent slopes (MmA).
Memphis silt loam, 2 to 6 percent slopes (MmB).
Memphis silt loam, 2 to 6 percent slopes, eroded (MmB2).
Memphis silt loam, 6 to 12 percent slopes, eroded (MmC2).
Memphis silt loam, 12 to 20 percent slopes, eroded (MmD2).
Memphis silt loam, 30 to 65 percent slopes (MmF).

The potential productivity of preferred hardwoods is high, but that of pine is comparatively low. Nevertheless, intense or moderately intense management is justified.

Because the soils of this group are silt loams, the hazard of gully erosion is severe on slopes of more than 6 percent. The steeper the slope, furthermore, the greater the hazard of erosion. Excess water readily cuts gullies in these soils. For this reason, the location, construction, and maintenance of roads and skid trails require special attention.

Track-type equipment and power winches are needed to harvest woodcrops efficiently on soils of this woodland group. Use of such equipment is severely limited in areas where slopes are more than 12 percent.

A favorable supply of moisture during the growing season helps to make plant competition severe. Shade-tolerant trees of low quality grow in the understory of sawlog stands. These trees prevent satisfactory natural regeneration of desirable trees after the overstory is removed by logging. Generally, intensive weeding is required to assure the dominance of a desirable woodcrop. Interplanting or conversion planting is not feasible. Competition to newly planted trees is usually severe in open fields that have been abandoned as cropland or pasture for 2 years or more.

WOODLAND SUITABILITY GROUP 12

In this group are well-drained, gently sloping to steep soils on loessial uplands. These soils are severely eroded. They are—

Loring silty clay loam, 2 to 6 percent slopes, severely eroded (LoB3).

Loring silty clay loam, 6 to 12 percent slopes, severely eroded (LoC3).

Loring silty clay loam, 12 to 20 percent slopes, severely eroded (LoD3).

Memphis silty clay loam, 6 to 12 percent slopes, severely eroded (MpC3).

Memphis silty clay loam, 12 to 20 percent slopes, severely eroded (MpD3).

Memphis silty clay loam, 20 to 30 percent slopes, severely eroded (MpE3).

The potential productivity of loblolly and shortleaf pines is fair. A medium intensity of management is justified. These soils improve rapidly following stabilization and protection, and after a relatively short time produce good hardwoods.

The hazard of gully erosion is very severe because slopes are steep and gullies form readily. To control gullyling, special care needs to be taken in locating, constructing, and maintaining roads and skid trails.

Equipment limitations are severe because the soils are steep and rough. It is difficult to use the track-type equipment and power winches essential for efficient harvesting of woodcrops.

Seedling mortality is moderately severe during short droughts in the early part of some growing seasons. These dry periods last 2 to 3 weeks and cause moderate to severe loss of newly planted trees. Natural seedlings usually grow too slowly to provide adequate cover.

WOODLAND SUITABILITY GROUP 13

This woodland suitability group has the following miscellaneous land types—

Gullied land (Gu).

Riverwash, gravelly (Rg).

Riverwash, sandy (Rh).

Swamp (Sw).

Gullied land consists of Coastal-Plains gravel and sand. On this land, seedling mortality is severe and native trees establish themselves slowly. Trees grow slowly and are of poor quality. Nevertheless, this land includes some narrow border areas and small silted basins where loblolly and shortleaf pines can be planted successfully.

Riverwash, gravelly, and Riverwash, sandy, are too droughty during the growing season to support woodcrops.

The areas of Swamp that are normally free of standing water during the last half or last two-thirds of the growing season are productive sites for willow and cypress trees. Other areas barely support tree growth.

Use of the Soils for Wildlife^a

The principal kinds of wildlife in Fulton County are cottontail rabbit, swamp rabbit, gray squirrel, fox squirrel, bobwhite quail, mourning dove, waterfowl (mostly ducks, but a few geese), raccoon, opossum, skunk, mink, muskrat, and red fox. The county also supports many kinds of nongame birds and mammals.

In the streams of the county are the kinds of game, pan, and rough fish that are commonly found throughout the State. Kentucky's Department of Fish and Wildlife

^a By WILLIAM H. CASEY, biologist, Soil Conservation Service, United States Department of Agriculture.

Resources has stocked most farm ponds with such game fish as largemouth bass and such pan fish as bluegill and other small sunfish. Carp, bullhead, and other rough fish are abundant and outnumber game fish in lakes and streams. Streams that have sizable populations of fish are the Mississippi River, Running Slough, Bayou du Chien, Obion Creek, Little Mud Creek, and Little Bayou du Chien.

The population of game animals and birds varies according to the use man has made of the soils of the county, and according to the inherent or induced fertility of those soils. Cottontail rabbits are common in the county, but their number fluctuates from year to year. Usually they are found in greatest numbers on the uplands in the Memphis-Loring, Grenada-Calloway-Loring-Memphis, and Loring-Memphis soil associations. (See soil association map at back of this report.) They are present in lesser numbers in the Commerce-Robinsonville and the Sharkey-Tunica soil associations in the western part of the county, south of the Mississippi River. They are almost totally absent from these same associations in the northernmost part of the county.

Gray squirrels are abundant and occur in about uniform number throughout the county. Fox squirrels are common, but fewer than gray squirrels, and not so evenly distributed. The largest numbers of fox squirrels are in the Commerce-Robinsonville and Sharkey-Tunica associations, in the detached part of the county enclosed by the Mississippi River. Lesser numbers of fox squirrels are in these same soil associations in the northern part of the county and in the Waverly-Falaya-Calloway association along Little Bayou du Chien. The remaining soil associations support only a small number of fox squirrels.

Bobwhite quail are most numerous in the Grenada-Calloway-Loring-Memphis association and least numerous in the Commerce-Robinsonville and the Sharkey-Tunica associations. Moderate numbers are in the Memphis-Loring and Loring-Memphis associations.

Mourning doves are common and are mostly in the Grenada-Calloway-Loring-Memphis and Loring-Memphis soil associations. Lesser numbers are in the Patton-Wakeland-Birds-Calloway association, and the lowest numbers are in the Commerce-Robinsonville and Sharkey-Tunica associations.

Ducks are common, but geese are rare. Waterfowl find suitable habitat in the low-lying sections of the county, in the Commerce-Robinsonville and Sharkey-Tunica associations, and in the Patton-Wakeland-Birds-Calloway association along Little Mud Creek.

Raccoons are abundant. The largest numbers are in the Commerce-Robinsonville and Sharkey-Tunica soil associations in the northernmost part of the county and in the detached part of the county encircled by the Mississippi River. The rest of the county has a rather uniform population.

Opossums are abundant and are distributed rather evenly throughout the county.

Skunks are common and are encountered mostly on the uplands, in the Memphis-Loring, Grenada-Calloway-Loring-Memphis, and Loring-Memphis associations.

Mink are common but are restricted mostly to the flood plains of the Commerce-Robinsonville and Sharkey-Tunica associations, and to the bottom lands and terraces of the Patton-Wakeland-Birds-Calloway association.

Muskrats are abundant and rather uniformly distributed over two-thirds of the county. Few are found in the Commerce-Robinsonville and the Sharkey-Tunica soil associations covering the western one-third of the county.

Red foxes are common throughout the county. They are least numerous in the Commerce-Robinsonville and Sharkey-Tunica associations.

Swamp rabbits are common in the swampy areas to the north and along Little Bayou du Chien. These rabbits are least numerous in the detached part of the county that is surrounded by the Mississippi River. The areas inhabited by swamp rabbits are almost all within the Commerce-Robinsonville and Sharkey-Tunica associations. Exceptions are the areas they occupy along Little Bayou du Chien, which is within the Waverly-Falaya-Calloway association.

Songbirds and other nongame birds are common throughout the county. The largest numbers are in the Memphis-Loring, Grenada-Calloway-Loring-Memphis, and Loring-Memphis associations. The least numbers are in the Commerce-Robinsonville and Sharkey-Tunica associations. The exact number of species present in the county is not known, but all, or nearly all, of the 228 species known to visit the State probably are in this county at one time or another.

Habitat Requirements

A knowledge of the kinds of habitat required is essential if wildlife populations are to be improved and controlled. Following are statements on the habitat requirements of the more common animals and birds in the county.

Cottontail rabbits are most plentiful in agricultural areas. They are vegetarians that eat such a wide variety of plants that food is seldom a problem. The shortage of desirable cover, however, is a problem. The proverbial brier patch is a good example of the best kind of protection the rabbit can have. Farms that have both cropland and pasture support the most rabbits, provided the fields are separated by wide, brushy fence rows. In periods of bitter cold, rabbits use abandoned groundhog burrows.

Gray squirrels prefer large, unbroken expanses of hardwood forest. A forest that has a high percentage of mature or deteriorating hardwood trees supports the most squirrels because the hollow trees furnish dens for most of these animals. Because squirrels eat nuts, their number fluctuates in proportion to the yield from the hardwood trees that furnish the bulk of their food. Among the important producers of food for squirrels are shagbark hickory, white oak, black oak, walnut, hackberry, sassafras, dogwood, and blackgun. Squirrels are also fond of mulberry and Osage-orange.

Fox squirrels, in contrast to gray squirrels, prefer small farm woodlots that have parklike openings. The need for den trees and food-producing trees is the same for fox squirrels as for gray squirrels, and the same kinds of trees meet this need. For some reason not clearly understood, fox squirrels seem to have greater preference for bottom lands and areas along streams than do gray squirrels.

Bobwhite quail thrive best on farms that have a mixture of cultivated land, pasture, and woodland. To quail, the most attractive fields are those not more than 10 acres in size that are separated by wide, brushy fence rows.

These birds require grass and other herbaceous cover for nesting, cultivated crops and wild seed-bearing plants for food, and brush and trees to protect them from weather and natural enemies. It is not necessary to provide them open water for drinking, except possibly during periods of extreme drought. Ordinarily, quail obtain sufficient moisture from the insects, berries, and fleshy fruit they eat.

Mourning doves are migratory, but a few probably remain in the county through the winter. They eat seeds and, therefore, find especially attractive the agricultural areas where grain crops are grown. Partly because they do not eat insects, doves require open water for drinking. Farm ponds are an important source of this water. For the most part, doves nest in pines, elms, or similar trees that have rather open foliage. A few nest on the ground. Plantings of pine trees or ornamental evergreens in urban parks and cemeteries are preferred nesting sites.

Waterfowl, with the exception of wood ducks, do not nest in this county. They do visit in winter. Ducks prefer millet, corn, smartweed, soybeans, and small acorns, especially those from pin-oak trees. Ducks sometimes feed in dry cornfields, but they prefer that their food be flooded with 1 to 12 inches of water. For this reason, ducks are most numerous on bottom lands that produce food and that are periodically flooded.

The feeding habits of geese differ from those of ducks. Geese readily feed in a dry cornfield. They are also grazers, and are especially fond of winter wheat and ladino clover.

Raccoons are likely to be found wherever there is woodland containing large, hollow trees they can use as dens. Raccoons are especially attracted to wooded areas along streams or near bodies of water. Their principal plant foods are persimmons, pecans, acorns, grapes, pokeberries, and corn. Their animal foods include crayfish, insects, frogs, and small mammals.

Opossums, though most common on farmland, are primarily woodland animals. Their dens are in abandoned groundhog burrows, under brushpiles, in old buildings, or in hollow trees. Their diet consists of fruits (particularly persimmons), insects, mice, garbage, and carrion. Wherever they live, opossums must have sufficient water.

Skunks are most abundant in agricultural areas having a good balance in acreage of woodland, brushland, and grassland. These beneficial animals seldom stray farther than a couple of miles from water. Their den is usually a hole in the ground, but they also use old buildings as temporary shelter. Their food consists of insects, mice, eggs, and various fruits and berries.

Mink, like raccoons, prefer wooded shores of streams and lakes. Their home is most often a brushpile or a burrow in a streambank. They spend most of their lives near water, where they feed on sick muskrats, aquatic insects, crayfish, frogs, and small fish. Occasionally they roam some distance from water, probably because food is scarce where they normally live.

Muskrats require an aquatic habitat. They live along streams and in farm ponds, ordinarily in burrows they dig into banks along the shore. In marshes, they build houses out of mud and aquatic vegetation. Their principal food consists of the stems and roots of cattails, rushes, and other aquatic plants. Sometimes they eat frogs, turtles, and fish. At certain times of the year, changed environmental conditions result in a "shuffling" of muskrat populations. This

explains why muskrats constantly reappear in farm ponds from which they have been removed.

Red foxes are most numerous in rolling or hilly country where the topography dictates use of the land partly for crops, partly for meadow, and partly for fairly open woods. Red foxes usually live in abandoned groundhog burrows. Rabbits and mice make up about 45 percent of their food; birds, 15 percent; insects, 20 percent; and vegetables and fruit, 20 percent.

Swamp rabbits, as their name suggests, live in thickets or dense woods bordering swamps. They are good swimmers and frequently use this ability to protect themselves. Like the cottontail rabbits, they are vegetarians that feed on many kinds of herbaceous and woody plants.

The kinds of habitat required by songbirds and other nongame birds are many and varied. Some nest on the ground, some in shrubs, some in tall trees, and some in hollow trees. Their food requirements are similarly varied. Some eat mostly seeds, insects, and fruits; others eat mostly meat. The landscape that has the most diverse and ample vegetation will have the greatest numbers and kinds of birds.

Fish have their habitat preferences and limitations. Large numbers of game, pan, and rough fish normally are not found together in the same body of water. These different kinds of fish require, or can tolerate, water with markedly different physical and chemical properties. Generally speaking, rough fish tolerate water that contains less than the minimum amount of oxygen required by game fish and pan fish. The rough fish, furthermore, feed largely by taste and smell, and for this reason, do not require water so clear as that needed by game fish and pan fish, both of which feed by sight. This partly explains why silt-laden, chemically polluted waters are usually devoid of the more desirable kinds of game and pan fish.

Wildlife Productivity Groups

Soils vary in their ability to support wildlife according to their capacity to produce many kinds of plants in large quantities. The soils of the county have been placed in three broad wildlife productivity groups. All the soils in one group are estimated to have similar capacity to produce food and cover for wildlife.

WILDLIFE PRODUCTIVITY GROUP 1

The soils in this group have a high to very high moisture-supplying capacity and are moderately high to high in natural fertility. They can produce many kinds of plants in large quantities, and they provide more food and cover for wildlife than any other soils of the county. These soils are—

- Adler silt loam (Ad).
- Bosket silt loam (Bo).
- Collins silt loam (Cc).
- Commerce silt loam (Cr).
- Dubbs silt loam (Db).
- Dundee silty clay loam (Dv).
- Loring silt loam, 0 to 2 percent slopes (LnA).
- Loring silt loam, 2 to 6 percent slopes (LnB).
- Loring silt loam, 2 to 6 percent slopes, eroded (LnB2).
- Memphis silt loam, 0 to 2 percent slopes (MmA).
- Memphis silt loam, 2 to 6 percent slopes (MmB).
- Memphis silt loam, 2 to 6 percent slopes, eroded (MmB2).

Memphis silt loam, 6 to 12 percent slopes, eroded (MmC2).
 Robinsonville fine sandy loam (Rm).
 Robinsonville silt loam (Rn).
 Robinsonville silty clay loam (Ro).

Because most of the acreage of these soils is cultivated, they probably produce more cottontail rabbits, mourning doves, and songbirds than other kinds of wildlife. If they were not so intensively cultivated, these soils would support larger and more varied populations of both migratory and resident wildlife. As now used, the soils could be improved for bobwhite quail by planting hedgerows around the larger fields and by planting patches of seed-bearing annual plants on farms where no cultivated grain crops are grown. Other kinds of wildlife can benefit if woodland and idle land are protected from fire and grazing.

Fishponds in Kentucky have been known to produce from 200 to 1,000 pounds of fish per surface acre, without fertilization. Farm ponds on soils in this group probably can produce more than 600 pounds of fish per surface acre.

WILDLIFE PRODUCTIVITY GROUP 2

In this group, the soils are moderately low to high in moisture-supplying capacity and moderate to moderately low in natural fertility. These soils can produce almost as many kinds of plants as the soils in wildlife group 1, but in lesser amounts. The soils in this group are—

Beulah fine sandy loam (Ba).
 Calloway silt loam, 0 to 2 percent slopes (CaA).
 Calloway silt loam, 2 to 6 percent slopes (CaB).
 Calloway silt loam, 2 to 6 percent slopes, eroded (CaB2).
 Calloway silt loam, terrace, 0 to 2 percent slopes (CbA).
 Calloway silt loam, terrace, 2 to 6 percent slopes (CbB).
 Commerce silt loam, low (Co).
 Commerce silty clay loam (Cr).
 Commerce silty clay loam, low (Cs).
 Falaya silt loam (Fa).
 Grenada silt loam, 0 to 2 percent slopes (GrA).
 Grenada silt loam, 2 to 6 percent slopes (GrB).
 Grenada silt loam, 2 to 6 percent slopes, eroded (GrB2).
 Grenada silt loam, 6 to 12 percent slopes, eroded (GrC2).
 Loring silt loam, 12 to 20 percent slopes, eroded (LnD2).
 Loring silty clay loam, 2 to 6 percent slopes, severely eroded (LoB3).
 Memphis silt loam, 12 to 20 percent slopes, eroded (MmD2).
 Memphis silty clay loam, 6 to 12 percent slopes, severely eroded (MpC3).
 Tunica clay (Tu).
 Wakeland silt loam (Wa).

These soils are less suited to intensive cultivation than those in wildlife group 1, but their balanced use for crops, trees, and pasture benefits wildlife. Probably the soils of this group support more quail, opossums, skunks, and red foxes than those of either of the other wildlife groups, but their moderate fertility results in only moderate production of food and cover for wildlife.

Farm ponds on these soils probably can produce about 600 pounds of fish per surface acre.

WILDLIFE PRODUCTIVITY GROUP 3

The soils in this group cannot produce many kinds of plants in large quantity because they are droughty, wet, or low in natural fertility. These soils are—

Birds silt loam (Bd).
 Crevasse loamy fine sand (Cv).
 Forestdale silty clay loam (Fo).
 Grenada silt loam, 2 to 6 percent slopes, severely eroded (GrB3).

Grenada silt loam, 6 to 12 percent slopes, severely eroded (GrC3).
 Gullied land (Gu).
 Henry silt loam (Hn).
 Henry silt loam, terrace (Ht).
 Loring silty clay loam, 6 to 12 percent slopes, severely eroded (LoC3).
 Loring silty clay loam, 12 to 20 percent slopes, severely eroded (LoD3).
 Made land (Ma).
 Memphis silt loam, 30 to 65 percent slopes (MmF).
 Memphis silty clay loam, 12 to 20 percent slopes, severely eroded (MpD3).
 Memphis silty clay loam, 20 to 30 percent slopes, severely eroded (MpE3).
 Patton silt loam (Po).
 Patton silt loam, overwash (Pe).
 Riverwash, gravelly (Rg).
 Riverwash, sandy (Rh).
 Sharkey clay (Sh).
 Sharkey silty clay loam, overwash (So).
 Swamp (Sw).
 Waverly-Falaya silt loams (Wf).

Since a relatively small acreage of the soils in this group is cultivated, food and cover are adequate for only a few quail and mourning doves.

These soils provide food and cover principally for ducks, swamp rabbits, and mink, and can support only small numbers of other wildlife native to the county. The total potential of these soils for production of food and cover is considerably less than that of the other two wildlife groups. Keeping livestock out of the woods would benefit gray squirrels. Probably, however, the best way of improving conditions for wildlife would be to apply the conservation practices that build up soil fertility.

Farm ponds on these soils probably would produce less than 600 pounds of fish per surface acre.

Engineering Properties of the Soils

Some soil properties are of special interest to the engineer because they affect the construction and maintenance of roads, airports, pipelines, building foundations, structures for water storage, structures for controlling erosion, drainage systems, and sewage disposal systems. The soil properties most important to the engineer are permeability to water, compaction characteristics, drainage, shrink-swell characteristics, grain size, plasticity, and pH. Depth to water table, depth to bedrock, and topography also are important. The characteristics of the soils of Fulton County are described in detail in another part of this soil survey report. Those that most affect engineering are interpreted in this section for engineers and others concerned with use of soil material in construction.

Information in this report can be used to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, and cables, and in planning detailed investigations at the selected locations.

4. Locate probable sources of gravel and other construction materials.
5. Correlate performance of engineering structures with soil mapping units to develop information for overall planning that will be useful in designing and maintaining engineering structures.
6. Determine the suitability of soil mapping units for cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained from other published maps and reports and aerial photographs to make maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

This report will not eliminate the need for on-site sampling and testing of sites for design and construction of specific engineering works and uses. The interpretations in this report should be used primarily in planning more detailed field investigations to determine the condition of soil material in place at the proposed site of engineering work.

Many of the terms soil scientists use in describing soils are defined in the Glossary at the back of this report. Engineers and others using this report need to acquaint themselves with some of these terms, since they have special meanings in soil science that are not familiar to those in other fields.

Engineering Test Data

To help evaluate the soils for engineering purposes, samples from 10 profiles of 5 soil series were tested by the Materials Research Laboratory, Kentucky Department of Highways. The results of these tests are given in table 5.

The engineering soil classifications in this table are based on mechanical analyses and on tests to determine the liquid limit and plastic limit of the soils. The mechanical analyses were made by combined sieve and hydrometer methods. The percentages of clay obtained by the hydrometer method are not to be used in naming soil textural classes, since soil scientists determine percentage of clay by the pipette method.

Tests for liquid limit and plastic limit were made to measure the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the soil material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which the soil material is plastic.

Table 5 also gives moisture-density (compaction) data for the tested soils. If a soil material is compacted at successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material will increase until the optimum moisture content is reached. After that, the density decreases with

increase in moisture content. The highest dry density obtained in the compaction test is termed "maximum dry density." Moisture-density data are important in earthwork, for, as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

California bearing ratio (CBR) indicates the resistance of soil material to load. The bearing value of the soil material is determined by dividing the load required to get a specific penetration by a standard load for the same penetration. The CBR values are actually percentages of standard load; thus, the higher the figure for bearing ratio, the better the load-bearing capacity of the soil material.

Engineering Classification Systems

Most highway engineers classify soil materials according to the system approved by the American Association of State Highway Officials (1, 8). It is a classification based on mechanical analyses, plasticity, and field performance of soils in highways. In this system soil materials are classified in seven principal groups. The groups range from A-1, consisting of gravelly soils of high bearing capacity, to A-7, consisting of clayey soils that have low strength when wet. Each soil is placed into one of these groups in table 6.

Within each of the principal groups of the AASHO classification, the relative engineering value of the soil material is indicated by a group index number. These numbers range from 0, for the best material, to 20 for the poorest. For the soils tested, the group index number is shown in parentheses, following the AASHO soil group symbol, in the next to last column of table 5.

Some engineers prefer to use the Unified Soil Classification system established by the Corps of Engineers, U.S. Army (16, 8). In this system the soils are identified according to their texture and plasticity and are grouped according to their performance as engineering construction materials. The system establishes 15 soil groups, which are divided as coarse-grained soils (eight classes), fine-grained soils (six classes), and highly organic soils (one class). The classification of the soils that were tested, according to the Unified system, is given in the last column of table 5.

Engineering Descriptions of the Soils

Table 6 gives a brief description of all the soils mapped in Fulton County, and their estimated engineering properties. It excludes only Gullied land, Made land, Riverwash, and Swamp, as these are miscellaneous land types lacking a developed soil profile.

Table 6 gives, for each soil, the textural classification of the U.S. Department of Agriculture, estimates of the AASHO classification, and estimates of the Unified classification. In addition, the grain size, permeability, available water capacity, reaction, and shrink-swell potential are estimated.

In table 6, the description of soil properties is based on a single typical profile for each soil mapped. This profile is described by layers significant to engineering, and the thickness of each layer is indicated in inches, always assuming the starting place as the surface of the soil. More

TABLE 5.—*Engin*
[Tests performed by the Kentucky Department of Highways in accordance with

Soil name and location	Parent material	SCS field No.	Depth	Horizon	Moisture-density ¹	
					Maximum dry density	Optimum moisture
Beulah fine sandy loam: 250 feet west of road and 0.65 mile north of Western School. (Modal.)	Sandy alluvium deposited by the Mississippi River.	S60-Ky- 38-9-1----- 38-9-6-----	Inches 0-9 44-57	Alp----- C2-----	Lb. per cu. ft. 104 102	Percent 16 19
300 yards west of State road 311 at Parkers Store. (Band C horizons coarser textured than in Modal profile.)	Sandy alluvium deposited by the Mississippi River.	38-15-1----- 38-15-3----- 38-15-6-----	0-6 11-16 28-60+	Ap----- BC----- C3-----	115 120 100	12 12 18
Calloway silt loam: 342 feet west and 510 feet north of southeast corner, sec. 28, T. 1 N., R. 3 W. (Modal.)	Loess.	38-2-1----- 38-2-2----- 38-2-4----- 38-2-7-----	0-9 9-15 21-29 46-64	Ap----- B2----- B3m2----- C-----	105 106 102 103	17 17 20 19
1.25 miles south of State road 94 and 1.25 miles west of Cayce. (More weakly developed fragipan and higher pH than in modal profile.)	Loess.	38-11-1----- 38-11-3----- 38-11-4----- 38-11-5-----	0-8 15-29 29-46 46-58+	Ap----- B22g----- B3m----- C-----	102 101 108 107	18 22 16 17
Dundee silty clay loam: 175 feet north and 700 feet east of road and 0.25 mile east of State road 311 and $\frac{1}{2}$ mile north of Tennessee line. (Modal.)	Alluvium deposited by the Mississippi River.	38-6-1----- 38-6-3----- 38-6-6-----	0-6 12-25 42-59	Ap----- B21----- D1-----	94 94 114	25 22 14
1 mile west of the Ridge Store. (B horizon darker than in modal profile.)	Alluvium deposited by the Mississippi River.	38-14-1----- 38-14-2----- 38-14-5-----	0-6 6-19 45-60+	Ap----- B2----- D-----	94 91 112	24 26 15
Patton silt loam: 250 feet west and 335 feet north of southeast corner, sec. 31, T. 1 N., R. 3 W. (Modal.)	Alluvium from loessal uplands.	38-3-1----- 38-3-3----- 38-3-4----- 38-3-6-----	0-8 17-23 23-37 50-63	Ap----- A13----- Bg----- Cg2-----	106 106 102 105	18 18 20 18
0.25 mile east of Poplar Grove Church. (A1 horizon thicker and A13 horizon finer textured than in modal profile.)	Alluvium from loessal uplands.	38-12-1----- 38-12-3----- 38-12-5-----	0-7 13-35 53-70+	Ap----- A13----- Cg2-----	101 100 103	19 22 19
Sharkey silty clay: 150 feet north of State road 925 and 500 feet west of Owens Slough. (Modal.)	Slack-water deposits from the Mississippi River.	38-7-1----- 38-7-5-----	0-4 31-49	Ap1----- Cg3-----	97 94	22 23
Sharkey silty clay loam, overwash: 0.5 mile south of State road 94 at Claeks store. (A horizon coarser textured than in modal profile.)	Slack-water deposits from the Mississippi River.	38-13-1----- 38-13-3-----	0-5 11-30	Ap----- Cgl-----	97 99	24 22

¹ Based on Moisture-Density Relations of Soils a Using 5.5-lb. Rammer and a 12-in. Drop, AASHO Designation T 99-57, Method A(1).

² Mechanical analyses according to the AASHO Designation T 88.

Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure,

the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 mm. in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 mm. in diameter is excluded from calculations of grain-size fractions. The mechanical

engineering test data

standard procedures of the American Association of State Highway Officials]

C.B.R.	Specific gravity	Mechanical analyses ²								Liquid limit	Plasticity index	Classification			
		Percentage passing sieve—			Percentage smaller than—							AASHO ³	Unified ⁴		
		No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.							
11.3	2.66	100	100	69	45	14	6	4	(⁵) 30	(⁵) 2	A-4(7) A-4(8)	ML. ML.			
8.2	2.66	100	100	89	81	39	15	13	(⁵)	(⁵)	A-2-4(0) A-4(1) A-3(0)	SM. SM. SP-SM.			
12.8	2.65	100	99	35	22	19	8	7							
19.0	2.65	100	99	38	27	20	15	14							
6.7	2.67	100	99	7	4	2	1	1	(⁵)	6 13 9	A-4(8) A-6(9) A-4(8)	ML-CL. ML-CL. ML-CL.			
13.5	2.65	100	97	96	85	59	17	12							
20.5	2.69	100	97	96	89	60	22	18							
6.3	2.69	100	98	97	92	68	34	26							
6.0	2.70	100	99	98	88	59	22	18	33	16 14 11	A-4(8) A-6(10) A-6(10) A-6(8)	ML-CL. CL. ML-CL. ML-CL.			
7.6	2.63	100	99	98	89	70	20	12							
6.9	2.67	100	99	98	92	69	33	26							
4.0	2.70	100	100	99	95	70	29	24							
7.2	2.67	100	100	99	95	68	26	21	34	19 23 22 10	A-7-6(11) A-7-6(15) A-2-4(0)	ML-CL. MH-CH. SM.			
4.5	2.65	100	99	96	94	89	57	36							
3.0	2.74	100	100	94	87	80	64	50							
8.8	2.67	100	100	29	17	12	9	8							
5.8	2.67	100	100	99	93	82	51	34	49 56 (⁵)	19 22 11	A-7-5(13) A-7-5(16) A-4(3)	ML. MH. ML.			
4.5	2.70	100	100	96	94	86	60	46							
8.7	2.68	100	100	51	37	22	14	11							
9.3	2.65	100	98	97	88	60	22	18	30 22 35 33	5 8 11 10	A-4(8) A-4(8) A-6(8) A-4(8)	ML. ML-CL. CL. ML-CL.			
4.3	2.61	100	99	98	94	70	28	22							
6.8	2.72	100	99	99	93	70	36	29							
7.0	2.71	100	98	97	93	64	25	18							
5.3	2.66	100	100	99	85	60	22	16	32 32 21	23 10	A-4-(8) A-7-6(14) A-4(8)	ML. CL. ML-CL.			
5.5	2.70	100	99	98	78	59	42	32							
5.7	2.72	100	99	98	91	58	29	21							
6.9	2.69	100	100	98	95	88	58	36	37 48	12 34	A-6(9) A-7-6(20)	ML-CL. CH.			
3.2	2.55	100	99	97	96	88	64	48							
6.0	2.63	100	100	98	97	88	52	36	44 40	18 16	A-7-6(12) A-7-6(11)	ML-CL. ML-CL.			
6.2	2.74	100	99	98	87	68	50	40							

analyses used in this table are not suitable for use in naming textural classes for soils.

³ Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (Pt. 1, Ed. 8): The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, AASHO Designation M 145-49(1).⁴ Based on the Unified Soil Classification System, Technical Memorandum No. 3-357, v. 1, Waterways Experiment Station, Corps of Engineers, March 1953 (16).⁵ Nonplastic.

TABLE 6.—*Brief description of the soils,*

Map symbol	Soil	Depth to seasonally high water table	Description of soil	Depth from surface	USDA texture
Ad	Adler silt loam.	2 ^{Feet}	Thick silt loam or loamy alluvium of loessal origin; in some places below the bluff area, at a depth of about 3 feet, loamy alluvium overlies clayey alluvium deposited by the Mississippi River.	0 to 36+ ^{Inches}	Silt loam-----
Ba	Beulah fine sandy loam.	10+	About 2½ feet of fine sandy loam over a thick bed of loamy fine sand or fine sand; on old natural levees bordering former channels of the Mississippi River.	0 to 30 30+	Fine sandy loam--- Loamy fine sand or fine sand.
Bd	Birds silt loam.	0	Thick silt loam derived from loessal alluvium--	0 to 72+	Silt loam-----
Bo	Bosket silt loam.	10+	About 8 inches of silt loam, then 16 inches of silty clay loam, and finally a thick bed of fine sandy loam or loamy fine sand; on old natural levees bordering former channels of the Mississippi River.	0 to 8 8 to 24 24 to 48+	Silt loam----- Silty clay loam--- Fine sandy loam to loamy fine sand.
CaA	Calloway silt loam, 0 to 2 percent slopes.	1 0 to 1	About 1½ feet of silt loam, underlain by a dense, compact fragipan of silt loam or silty clay loam, which at a depth of 4 feet overlies silt loam; on uplands derived from thick loess.	0 to 18 18 to 48 48 to 60+	Silt loam----- Silt loam or silty clay loam. Silt loam-----
CaB	Calloway silt loam, 2 to 6 percent slopes.				
CaB2	Calloway silt loam, 2 to 6 percent slopes, eroded.				
CbA	Calloway silt loam, terrace, 0 to 2 percent slopes.	1 0 to 1	About 1½ feet of silt loam underlain by a fragipan of silt loam or silty clay loam which extends to a depth of 4 feet and overlies silt loam; on stream terraces derived from loess.	0 to 18 18 to 48 48 to 60+	Silt loam----- Silt loam to silty clay loam. Silt loam-----
CbB	Calloway silt loam, terrace, 2 to 6 percent slopes.				
Cc	Collins silt loam.	1½	Thick silt loam derived from loessal alluvium--	0 to 60+	Silt loam-----
Cm	Commerce silt loam.	0 to 2	About 3½ feet of silt loam, underlain by silty clay loam derived from Mississippi River alluvium.	0 to 40 40 to 48+	Silt loam----- Silty clay loam---
Co	Commerce silt loam, low.				
Cr	Commerce silty clay loam.	0 to 2	Thick silty clay loam derived from alluvium deposited by the Mississippi River.	0 to 48+	Silty clay loam---
Cs	Commerce silty clay loam, low.				
Cv	Crevasse loamy fine sand.	0 to 4	About 6 inches of loamy fine sand, underlain by about 18 inches of loamy sand, which overlies a thick bed of loamy fine sand derived from Mississippi River alluvium. (In places underlain by thin layers of silt loam and sand or by poorly drained silt loam.)	0 to 6 6 to 25 25 to 50+	Loamy fine sand--- Loamy sand----- Loamy fine sand---
Db	Dubbs silt loam.	0 to 3	About 6 inches of silt loam, then 1½ feet of silty clay loam and 1 foot of silt loam, and finally a thick bed of fine sandy loam or sandy loam derived from Mississippi River alluvium.	0 to 6 6 to 24 24 to 36 36 to 48+	Silt loam----- Silty clay loam--- Silt loam----- Fine sandy loam---
Du	Dundee silty clay loam.	2½ 0 to 3	About 6 inches of silty clay loam, underlain by about 2 feet of silty clay, which overlies a thick bed of loam or fine sandy loam.	0 to 6 6 to 30 30 to 60+	Silty clay loam--- Silty clay----- Fine sandy loam---
Fa	Falaya silt loam.	0 to 1	Thick silt loam derived from loessal alluvium--	0 to 72+	Silt loam-----
Fo	Forestdale silty clay loam.	0 to 2	About 6 inches of silty clay loam, underlain by 2 feet of clay and 1 foot of silty clay loam, which overlies silt loam or very fine sandy loam; on low terraces consisting of Mississippi River alluvium.	0 to 6 6 to 40 40 to 50	Silty clay loam--- Clay----- Silt loam-----

See footnotes at end of table.

and their estimated physical properties

Unified	AASHO	Percentage passing—		Permeability	Available water capacity	Reaction	Shrink-swell potential
		No. 10 sieve (2.0 mm.)	No. 200 sieve (0.074 mm.)				
ML-----	A-4-----	90 to 100	80 to 100	Inches per hour 2.50 to 5.0	Inches per inch of soil 0.22	pH 6.6 to 7.3	Low.
ML or SM-----	A-4 or A-2-----	100	60 to 80	5.0 to 10.0	0.13	5.6 to 6.5	Low.
ML or SM, or SP-SM.	A-4 or A-3-----	100	10 to 80	10.0+	0.08	5.6 to 6.0	Low.
ML-----	A-4-----	100	98 to 100	0.80 to 2.50	0.22	6.1 to 7.3	Low.
ML or CL-----	A-4 or A-6-----	100	95 to 100	0.80 to 2.50	0.22	6.1 to 6.5	Low to moderate.
CL-----	A-7-----	100	95 to 100	0.80 to 2.50	0.19	6.1 to 6.5	Moderate to high.
SC or SM-----	A-2 or A-4-----	100	30 to 50	5.0 to 10.0	0.13 to 0.09	6.1 to 6.5	Low.
ML-----	A-4-----	100	90 to 100	0.80 to 2.50	0.22	4.5 to 5.5	Low.
CL or ML-----	A-6 or A-7-----	100	95 to 100	0.05 to 0.20	0.20	4.5 to 5.5	Moderate to high.
ML or CL-----	A-4 or A-6-----	100	95 to 100	0.80 to 2.50	0.22	4.5 to 5.5	Low to moderate.
ML-----	A-4-----	100	95 to 100	0.80 to 2.50	0.22	² 5.0 to 5.5	Low.
CL or ML-----	A-6-----	100	95 to 100	0.05 to 0.20	0.20	² 6.0 to 7.0	Moderate to high.
ML or CL-----	A-4 or A-6-----	100	95 to 100	0.80 to 2.50	0.22	6.0 to 7.0	Low to moderate.
ML-----	A-4-----	100	95 to 100	2.50 to 5.00	0.22	5.1 to 5.5	Low.
ML or CL-----	A-4-----	100	90 to 100	0.80 to 2.50	0.22	6.6 to 7.3	Low to moderate.
CL-----	A-6-----	100	90 to 100	0.20 to 0.80	0.19	6.6 to 7.3	Moderate.
SM-----	A-2-----	100	20	10.0+	0.09	6.1 to 6.5	Very low.
SM-----	A-2-----	100	10	10.0+	0.075	6.1 to 6.5	Very low.
SM-----	A-2-----	100	20	10.0+	0.09	6.6 to 7.3	Very low.
ML or CL-----	A-4 or A-6-----	100	95 to 100	0.80 to 2.50	0.22	6.1 to 6.5	Low to moderate.
CL-----	A-6-----	100	95 to 100	0.80 to 2.50	0.19	6.1 to 6.5	Moderate.
ML or CL-----	A-4 or A-6-----	100	90 to 100	0.80 to 2.50	0.22	6.1 to 6.5	Low to moderate.
SC or SM-----	A-2 or A-4-----	100	30 to 50	5.0 to 10.0	0.13	6.1 to 6.5	Low.
ML or CL-----	A-7-----	100	95	0.80 to 2.50	0.19	5.6 to 6.5	Moderate to high.
MH or CH-----	A-7-----	100	95 to 100	0.20 to 0.80	0.16	5.6 to 6.5	High.
SM or ML-----	A-2 or A-4-----	100	30 to 55	5.0 to 10.0	0.13	5.6 to 6.5	Low.
ML-----	A-4-----	100	95 to 100	0.80 to 2.50	0.22	5.1 to 5.5	Low.
CL-----	A-6-----	100	90 to 100	0.20 to 0.80	0.19	5.6 to 6.5	Moderate.
CH-----	A-7-----	100	95 to 100	0.05 to 0.20	0.14	5.6 to 6.5	High.
ML-----	A-4-----	100	85 to 95	0.80 to 2.50	0.22 to 0.17	5.6 to 6.5	Low.

TABLE 6.—*Brief description of the soils, and*

Map symbol	Soil	Depth to seasonally high water table	Description of soil	Depth from surface	USDA texture
GrA	Grenada silt loam, 0 to 2 percent slopes.	1 to 1½ ^{Feet}	About 2 feet of silt loam, underlain by a fragipan of silty clay loam that extends to a depth of 4 feet and overlies silt loam; on uplands derived from thick loess.	0 to 24 ^{Inches}	Silt loam-----
GrB	Grenada silt loam, 2 to 6 percent slopes.			24 to 45	Silty clay loam-----
GrB2	Grenada silt loam, 2 to 6 percent slopes, eroded.			45 to 60+	Silt loam-----
GrB3	Grenada silt loam, 2 to 6 percent slopes, severely eroded.				
GrC2	Grenada silt loam, 6 to 12 percent slopes, eroded.				
GrC3	Grenada silt loam, 6 to 12 percent slopes, severely eroded.				
Hn	Henry silt loam.	0 to ½	About 14 inches of silt loam, underlain by a dense, compact fragipan of silt loam or silty clay loam that extends to a depth of 4 feet and overlies silt loam; on uplands derived from thick loess.	0 to 14 14 to 48 48 to 72	Silt loam----- Silt loam or silty clay loam. Silt loam-----
Ht	Henry silt loam, terrace.	0	About 14 inches of silt loam, underlain by a fragipan of silty clay loam that extends to a depth of about 4 feet and overlies silt loam; on stream terraces of loessal origin.	0 to 14 14 to 48 48 to 60+	Silt loam----- Silty clay loam----- Silt loam-----
LnA	Loring silt loam, 0 to 2 percent slopes.	10+	About 1 foot of silt loam, underlain by silty clay loam and a weak fragipan at a depth of about 32 inches, and silt loam at a depth of 4 feet; on uplands derived from thick loess.	0 to 12 12 to 48 48 to 60+	Silt loam----- Silty clay loam----- Silt loam-----
LnB	Loring silt loam, 2 to 6 percent slopes.				
LnB2	Loring silt loam, 2 to 6 percent slopes, eroded.				
LnC2	Loring silt loam, 6 to 12 percent slopes, eroded.				
LnD2	Loring silt loam, 12 to 20 percent slopes, eroded.				
LoB3	Loring silty clay loam, 2 to 6 percent slopes, severely eroded.				
LoC3	Loring silty clay loam, 6 to 12 percent slopes, severely eroded.				
LoD3	Loring silty clay loam, 12 to 20 percent slopes, severely eroded.				
MmA	Memphis silt loam, 0 to 2 percent slopes.	10+	About 1 foot of silt loam, underlain by about 3 feet of silty clay loam, which overlies silt loam; on uplands derived from thick loess.	0 to 13 13 to 45 45 to 60+	Silt loam----- Silty clay loam----- Silt loam-----
MmB	Memphis silt loam, 2 to 6 percent slopes.				
MmB2	Memphis silt loam, 2 to 6 percent slopes, eroded.				
MmC2	Memphis silt loam, 6 to 12 percent slopes, eroded.				
MmD2	Memphis silt loam, 12 to 20 percent slopes, eroded.				
MmF	Memphis silt loam, 30 to 65 percent slopes.				
MpC3	Memphis silty clay loam, 6 to 12 percent slopes, severely eroded.				
MpD3	Memphis silty clay loam, 12 to 20 percent slopes, severely eroded.				
MpE3	Memphis silty clay loam, 20 to 30 percent slopes, severely eroded.				
Pa	Patton silt loam.	0	About 16 inches of silt loam, underlain by 16 inches of silty clay loam, which overlies a thick bed of silt loam of loessal origin.	0 to 16 16 to 32 32 to 60+	Silt loam----- Silty clay loam----- Silt loam-----

See footnotes at end of table.

their estimated physical properties—Continued

Unified	AASHO	Percentage passing—		Permeability	Available water capacity	Reaction	Shrink-swell potential
		No. 10 sieve (2.0 mm.)	No. 200 sieve (0.074 mm.)				
ML or CL-----	A-4 or A-6---	100	98 to 100	Inches per hour 0.80 to 2.50	Inches per inch of soil 0.22	pH 4.5 to 5.5	Low to moderate.
CL-----	A-6-----	100	98 to 100	0.05 to 0.20	0.19	4.5 to 5.5	Moderate.
ML or CL-----	A-4 or A-6---	100	98 to 100	0.80 to 2.50	0.22	4.5 to 5.5	Low to moderate.
ML-----	A-4-----	98 to 100	92 to 96	0.20 to 0.80	0.22	4.5 to 5.5	Low.
CL or ML-----	A-6-----	99 to 100	92 to 96	<0.05	0.20	4.5 to 5.5	Moderate.
ML or CL-----	A-4-----	100	97 to 100	0.80 to 2.50	0.22	4.5 to 5.5	Low.
ML-----	A-4-----	100	98 to 100	0.20 to 0.80	0.22	5.1 to 5.5	Low.
CL-----	A-6-----	100	98 to 100	<0.05	0.19	6.1 to 7.0	Moderate.
ML or CL-----	A-4-----	100	98 to 100	0.80 to 2.50	0.22	6.1 to 7.0	Low.
ML-----	A-4-----	100	100	0.80 to 2.50	0.22	4.5 to 5.5	Low.
CL or ML-----	A-7-----	100	100	0.20 to 0.80	0.19	4.5 to 5.5	Moderate to high.
ML or CL-----	A-4 or A-6---	100	100	0.80 to 2.50	0.22	4.5 to 5.5	Low to moderate.
ML-----	A-4-----	100	100	0.80 to 2.50	0.22	5.1 to 5.5	Low.
ML or CL-----	A-6 or A-7---	100	100	0.80 to 2.50	0.19	4.5 to 5.0	Moderate to high.
ML or CL-----	A-4 or A-6---	100	100	0.80 to 2.50	0.22	4.5 to 5.0	Low to moderate.
ML-----	A-4-----	100	95 to 100	0.80 to 2.50	0.22	6.1 to 6.5	Low.
ML or CL-----	A-4 or A-7---	100	95 to 100	0.20 to 0.80	0.19	6.6 to 7.3	Low to moderate.
ML or CL-----	A-4 or A-6---	100	95 to 100	0.80 to 2.50	0.22	6.6 to 7.3	Low to moderate.

TABLE 6.—*Brief description of the soils, and*

Map symbol	Soil	Depth to seasonally high water table <i>Feet</i>	Description of soil	Depth from surface <i>Inches</i>	USDA texture
Po	Patton silt loam, overwash.	0	About 2 feet of silt loam, underlain by 16 inches of silty clay loam, which overlies a thick bed of silt loam of loessal origin.	0 to 26 26 to 42 42 to 70+ 0 to 48+	Silt loam..... Silty clay loam..... Silt loam..... Fine sandy loam.....
Rm	Robinsonville fine sandy loam.	0 to 3	Fine sandy loam derived from Mississippi River alluvium.		
Rn	Robinsonville silt loam.	0 to 3	About 2 feet of silt loam, underlain by a thick bed of fine sandy loam derived from Mississippi River alluvium.	0 to 28 28 to 48+	Silt loam..... Fine sandy loam.....
Ro	Robinsonville silty clay loam.	0 to 3	About 2 feet of silty clay loam, underlain by a thick bed of fine sandy loam derived from Mississippi River alluvium.	0 to 24 24 to 48+	Silty or sandy clay loam..... Fine sandy loam.....
Sh	Sharkey clay.	0	About 3 feet or more of clay derived from slack-water alluvium deposited by the Mississippi River.	0 to 72+	Clay-----
So	Sharkey silty clay loam, overwash.	0	About 1 foot of silty clay loam, underlain by 3 feet or more of clay derived from slack-water alluvium deposited by the Mississippi River.	0 to 12 12 to 72	Silty clay loam..... Clay-----
Tu	Tunica clay.	0 to 1	About 2½ feet of clay, underlain by a bed of silt loam or fine sandy loam derived from Mississippi River alluvium.	0 to 30 30 to 48+	Clay----- Fine sandy loam to silt loam.....
Wa	Wakeland silt loam.	0 to 1	Thick silt loam derived from loessal alluvium.	0 to 72	Silt loam.....
Wf	Waverly-Falaya silt loams.	0	About 4 feet of silt loam, underlain by silty clay loam derived from loessal alluvium.	0 to 40 40 to 60+	Silt loam..... Silty clay loam.....

¹ Perched water table.² Reaction above a depth of 30 inches.³ Reaction below a depth of 30 inches.

detailed descriptions of each profile may be found in the section "Formation, Morphology, and Classification of the Soils."

The brief soil description (fourth column in table 6) gives the position of the soil on the landscape, the texture and thickness of its significant horizons, and some properties of its parent material. If the soil has a fragipan, a layer of soil material that is nearly impervious, this is mentioned. Soils that have a fragipan are waterlogged during periods of rainy weather, and water stands on them. Existence of a fragipan affects depth to water table. Soils with this compact layer have a perched water table, as is shown by the footnote to the third column in table 6.

The depth to the seasonally high water table (third column in table 6) was estimated in the field by observing each soil during the progress of the survey. The depth from the surface refers to depth in the typical soil profile, which is described for each soil series in the section "Descriptions of the Soils."

The percentages of soil material passing through No. 10 and No. 200 sieves are estimates based on test data for soils in Fulton County and on similar test data available for soils of the same kind in other areas. For soils for which no test data were available, the estimates of sieve size are based on the known USDA texture of the soil material,

on known amount of coarse material in the soil, and on test data for similar soils.

Permeability, which indicates the rate at which water will move through soil material that is not compacted, is measured in inches per hour. The permeability of each soil layer was estimated by observing the soil in the field and by studying the structure and consistence of its layers.

The available water capacity is an approximation of the amount of capillary water in the soil when it is wet to field capacity. It is measured in inches per inch of soil. When the soil is air dry, this amount of water will wet the soil material described to a depth of 1 inch without deeper percolation. These estimates are based on the texture of the soil and percentage of coarse material in the soil.

The estimates for permeability and for available water capacity are particularly significant in planning drainage and irrigation systems.

Reaction, the estimated degree of acidity or alkalinity, is expressed in pH value, which is the common logarithm of the reciprocal of the hydrogen-ion concentration of a solution. A notation of pH 7.0 indicates precise neutrality; higher values indicate increasing alkalinity, and lower values indicate increasing acidity.

The ratings for shrink-swell potential indicate the volume change to be expected with a change in the moisture content; that is, shrinking of the soil when it dries

their estimated physical properties—Continued

Unified	AASHO	Percentage passing—		Permeability	Available water capacity	Reaction	Shrink-swell potential
		No. 10 sieve (2.0 mm.)	No. 200 sieve (0.074 mm.)				
ML	A-4	100	95 to 100	Inches per hour 0.80 to 2.50	0.22	pH 6.1 to 6.5	Low.
ML or CL	A-4 or A-7	100	95 to 100	0.20 to 0.80	0.19	6.6 to 7.3	Low to moderate.
ML or CL	A-4 or A-6	100	95 to 100	0.80 to 2.50	0.22	6.6 to 7.3	Low to moderate.
ML	A-4	100	60 to 80	5.00 to 10.0	0.13	6.6 to 7.3	Low.
ML or CL	A-4 or A-6	100	90 to 100	0.80 to 2.50	0.22	6.6 to 7.3	Low to moderate.
SM or ML	A-2 or A-4	100	40 to 55	5.00 to 10.0	0.13	6.6 to 7.3	Low.
CL	A-6	100	95 to 100	0.20 to 0.80	0.19	6.6 to 7.3	Moderate.
SM or ML	A-4	100	40 to 55	5.00 to 10.0	0.13	6.6 to 7.3	Low.
CH	A-7	100	100	0.05 to 0.20	0.14	6.6 to 7.3	Very high.
CL	A-7	100	98 to 100	0.20 to 0.80	0.19	6.6 to 7.3	Moderate to high.
CH	A-7	100	100	0.05 to 0.20	0.14	6.6 to 7.3	Very high.
CH	A-7	100	100	0.05 to 0.20	0.14	6.6 to 7.3	Very high.
SM to ML	A-4	100	40 to 85	2.50 to 5.00	0.13 to 0.22	6.6 to 7.3	Low.
ML	A-4	100	85 to 100	0.80 to 2.50	0.22	6.6 to 7.3	Low.
ML	A-4	100	85 to 100	0.80 to 2.50	0.22	5.1 to 5.5	Low.
ML or CL	A-4 or A-6	100	97 to 100	0.80 to 2.50	0.19	5.1 to 5.5	Low to moderate.

* Reaction below depth of 2 feet.

* Permeability between depths of 32 and 48 inches.

and swelling when it takes up moisture. Ratings are high, moderate, and low. They are determined primarily by the amount and type of clay in the soil material. Clean sands and gravels (structureless, and single-grain soils); soils containing small amounts of nonplastic to slightly plastic fines; and most other nonplastic to slightly plastic soils have low shrink-swell potential.

Engineering Interpretations

Table 7 shows those characteristics of the soils that most affect their use for engineering. The information in this table is based on estimated data in table 6, on actual test data given in table 5, on field experience, and on observed performance of the soils. The estimates on soil limitations that affect construction of farm ponds, agricultural drainage, irrigation, and terraces and diversion ditches are of most interest to conservation engineers. The estimates in other columns are of interest to highway engineers.

Suitability of a soil material as a source of topsoil for dressing slopes, shoulders of roads, pond embankments, and ditch lines was estimated after considering its texture, structure, content of organic matter, content of coarse material, and reaction. These properties signifi-

cantly affect stability of soil material and its capacity to support a good cover of vegetation.

The suitability of a soil material as a source of road fill was estimated after taking into account its compaction characteristics, plasticity, and erodibility. Generally, the gravelly, coarse-textured soil materials are best for road fill, and highly plastic clays are poor or not suitable.

As a source of sand and gravel, most soils of this county are not suitable. As shown in table 7, Beulah, Bosket, and Crevasse soils are a source of some fine sand. River-wash, a miscellaneous land type not listed in table 7, lies at low elevations along the Mississippi River and contains deposits of sand and gravel.

Location of highways is affected by several factors, such as high water table and flooding. These features are recorded in table 7.

Suitability of soils for winter grading is rated excellent, good, fair, or poor. As indicated in table 7, no soil in the county is rated excellent, and only seven are rated good. In winter, the silty and clayey soils cannot be dried readily to the optimum moisture content that is necessary for moving and compaction. Limited work can be done, however, on some of the better drained soils.

Susceptibility of soils to frost action is rated low, moderate, or high in table 7. Most soils in the county are highly susceptible to frost action.

Erosion of cuts and fills is a severe hazard on most soils of this county, as is shown by the ratings in table 7.

Soil limitations that affect suitability of soil for construction of farm ponds are mentioned in table 7. In locating a site for a farm pond, the suitability of the site as reservoir area and as a source of material suitable for both the core of the embankment and the embankment are primary considerations. Highly permeable soils are not suitable as reservoir areas, nor are soils underlain by cherty or gravelly material or by bedrock that contains crevices or caverns. Deep colluvial deposits at the foot

of slopes, or alluvial deposit on flood plains, are not suitable because their substratum is rapidly permeable. If leakage from ponds is to be prevented in such areas, the permeable material at the site of the embankment must be graded away, down to impervious material, and a core of impervious material placed in the embankment. Soils that have a high shrink-swell potential, low strength and stability, or rapid permeability are undesirable for use as cores in embankments or for embankments. In Fulton County, all the soils on uplands are suitable for farm ponds. Many of the soils on bottom lands, however, are

TABLE 7.—Engineering

Soil type and map symbol	Suitability as source of—			Soil features affecting highway location	Suitability for winter grading
	Topsoil ¹	Road fill	Sand and gravel		
Adler silt loam (Ad).....	Good.....	Fair.....	Not suitable.....	Subject to overflow where not protected by levees.	Poor to fair.....
Buelah fine sandy loam (Ba).....	Good.....	Good.....	Fine sand below 2 feet.	None.....	Good.....
Birds silt loam (Bd).....	Fair to good..	Fair.....	Not suitable.....	Subject to overflow.....	Poor.....
Bosket silt loam (Bo).....	Good.....	Fair.....	Fine sand, with 10 to 30 percent silt or clay below 2 feet.	None.....	Good.....
Calloway silt loam (CaA, CaB, CaB2).	Good.....	Fair.....	Not suitable.....	Perched water table during wet seasons.	Poor.....
Calloway silt loam, terrace (CbA, CbB).	Good.....	Fair.....	Not suitable.....	Subject to overflow.....	Poor.....
Collins silt loam (Cc).....	Good.....	Fair.....	Not suitable.....	Subject to overflow.....	Poor to fair.....
Commerce silt loam (Cm, Co).....	Good.....	Fair.....	Not suitable.....	Subject to overflow where not protected by levees.	Fair to good..
Commerce silty clay loam (Cr, Cs).....	Fair to good..	Fair.....	Not suitable.....	Subject to overflow where not protected by levees.	Fair to poor..
Crevasse loamy fine sand (Cv).....	Poor.....	Good.....	Fine sand below 8 inches, with a stratified layer of silt in places.	Subject to overflow where not proteted by levees.	Good.....
Dubbs silt loam (Db).....	Good.....	Fair.....	Not suitable.....	Subject to overflow where not protected by levees.	Fair to good..
Dundee silty clay loam (Du).....	Fair to good..	Poor to fair..	Not suitable.....	Subject to overflow where not protected by levees; plastic clay layer at a depth of 6 inches.	Fair.....
Falaya silt loam (Fa).....	Good.....	Fair.....	Not suitable.....	Subject to overflow; high seasonal water table.	Poor.....
Forestdale silty clay loam (Fo).....	Fair.....	Poor.....	Not suitable.....	Subject to overflow where not protected by levees; high seasonal water table; plastic clay layer at a depth of 6 inches.	Poor.....
Grenada silt loam (GrA, GrB, GrB2, GrB3, GrC2, GrC3).	Good.....	Fair.....	Not suitable.....	Perched seasonal water table; 0 to 12 percent slopes.	Fair.....
Henry silt loam (Hn).....	Poor to fair ..	Fair.....	Not suitable.....	Perched seasonal water table.	Poor.....
Henry silt loam, terrace (Ht).....	Poor to fair ..	Fair.....	Not suitable.....	Subject to overflow.....	Poor.....

See footnotes at end of table.

not suitable; they are highly permeable, or in places, subject to excessive seepage.

Suitability of a soil as a site for an agricultural drainage system is affected by its permeability, depth to a slowly permeable layer, texture, and depth to seasonally high water table. The soils on bottom lands, and some of those on uplands and terraces, need a complete drainage system. Generally, the soils on bottom lands that have an adequate outlet can be drained satisfactorily by tile systems. Tile drainage is not suitable for soils on uplands or terraces, as adequate outlets either do not exist or are not within a

reasonable distance. Subsurface drainage is difficult to establish on soils that have a slowly permeable layer near the surface. Such soils generally need surface drainage. If subsurface drainage is used on such soils, the tile lines should be placed above the fragipan, or slowly permeable layer. Generally, tile lines need to be placed closer than in areas where there is no fragipan. Draining these soils by tile is probably too expensive to be justified, except where high-income crops can be produced.

Soil limitations that affect irrigation are given in table 7. Though irrigation is not now used in the county, many

interpretations

Susceptibility to frost action	Erosion of cuts and fills	Soil limitations affecting—			
		Farm ponds ²	Agricultural drainage	Irrigation ³	Terraces and diversions
High-----	Severe-----	No limitations for embankments, but highly permeable.	None-----	None-----	None.
Moderate--	Severe-----	Many limitations; not suitable for ponds.	(Drainage, not needed.)	Low moisture-holding capacity.	(Terraces and diversions not needed.)
High-----	Severe-----	Highly permeable-----	Outlets scarce-----	Drainage outlets scarce-----	Poor drainage overflow and seasonal high water table.
High-----	Severe-----	Many limitations; soil not suitable for ponds.	(Drainage not needed.)	None-----	(Terraces and diversions not needed.)
High-----	Severe-----	None-----	Fragipan at a depth of about 18 inches.	Shallow to compact layer.	None.
High-----	Severe-----	None-----	Fragipan-----	Shallow to compact layer.	None.
High-----	Severe-----	No limitations for embankments; highly permeable.	None-----	None-----	None.
High-----	Severe-----	Permeable substratum in places.	Outlets scarce-----	None-----	(Terraces and diversions not needed.)
High-----	Severe to moderate.	Permeable substratum in places.	Outlets scarce-----	None-----	(Terraces and diversions not needed.)
Low-----	Severe-----	Many limitations; soil not suitable for ponds.	(Drainage not needed.)	Very low moisture-holding capacity.	(Terraces and diversions not needed.)
High-----	Moderate to severe.	Highly permeable-----	(Drainage not needed.)	None-----	(Terraces and diversions not needed.)
Moderate--	Moderate-----	Permeable substratum-----	None-----	None-----	(Terraces and diversions not needed.)
High-----	Severe-----	No limitations for embankments; but highly permeable.	Outlets scarce-----	None-----	Some limitations because of wetness and overflow.
Moderate--	Moderate-----	Permeable substratum-----	Outlets scarce-----	Low infiltration rate-----	(Terraces and diversions not needed.)
High-----	Severe-----	None-----	Poor drainage in least sloping areas; not suited to tile drainage.	Compact layer at 2 feet; this layer nearer surface in the eroded soil.	No limitations; maximum grade will facilitate drainage; high erodibility for diversion ditches.
High-----	Severe-----	None-----	Many limitations; not suited to tile drainage.	Shallow to compact layer; low moisture-holding capacity.	Terracing not needed; use maximum grade to facilitate drainage.
High-----	Severe-----	None-----	Many limitations; not suited to tile drainage.	Shallow to compact layer; low moisture-holding capacity.	Terracing not needed; use maximum grade to facilitate drainage.

TABLE 7.—*Engineering*

Soil type and map symbol	Suitability as source of—			Soil features affecting highway location	Suitability for winter grading
	Topsoil ¹	Road fill	Sand and gravel		
Loring silt loam (LnA, LnB, LnB2, LnC2, LnD2).	Good.....	Fair.....	Not suitable.....	0 to 20 percent slopes.....	Good.....
Loring silty clay loam (LoB3, LoC3, LoD3).					
Memphis silt loam (MmA, MmB, MbB2, MmC2, MbD2, MmF).	Good.....	Fair.....	Not suitable.....	0 to 65 percent slopes.....	Good.....
Memphis silty clay loam (MpC3, MpD3, MpE3).					
Patton silt loam (Pa).....	Good.....	Fair.....	Not suitable.....	Subject to overflow; high seasonal water table.	Poor.....
Patton silt loam, overwash (Po).....	Good.....	Fair.....	Not suitable.....	Subject to overflow where not protected by levees.	Good.....
Robinsonville fine sandy loam (Rm).....				Subject to overflow where not protected by levees.	Good.....
Robinsonville silt loam (Rn).....	Good.....	Fair.....	Not suitable.....	Subject to overflow.....	Fair.....
Robinsonville silty clay loam (Ro).....	Fair.....	Poor.....	Not suitable.....		
Sharkey clay (Sh).....				Subject to overflow where not protected by levees; plastic clay soils.	Poor.....
Sharkey silty clay loam, overwash (So).....	Poor.....	Poor.....	Not suitable.....		
Tunica clay (Tu).....	Poor.....	Poor.....	Not suitable.....	Subject to overflow where not protected by levees; plastic clay layer.	Poor.....
Wakeland silt loam (Wa).....	Good.....	Fair.....	Not suitable.....	Subject to overflow; high seasonal water table.	Poor.....
Waverly-Falaya silt loams (Wf).....	Fair.....	Fair.....	Not suitable.....	Subject to overflow; high seasonal water table.	Poor.....

¹ Rating for topsoil is based on availability and suitability of surface soil.

² Limitations are those affecting reservoir area, and use of the soil as embankment material.

of the soils on the flood plain of the Mississippi River could be row irrigated if they were leveled. Many of the soils, both on bottom lands and uplands, are suitable for sprinkler irrigation. The soils most desirable for irrigation are those that are nearly level and that have a high moisture-supplying capacity, a deep root zone, a moderate rate of infiltration, and a high level of fertility. Soils that are steep, excessively drained, poorly drained, severely eroded, shallow over bedrock, or shallow over a slowly permeable layer are the least desirable.

Diversion ditches and terraces are needed on some soils of the county, and on these, the soil properties that most affect construction are depth to bedrock, erodibility, and the presence of coarse material, rock outcrop, or material difficult to vegetate. When terraces or diversion ditches are built on soils that have a fragipan, the grade should be sufficient to facilitate drainage.

Formation, Morphology, and Classification of the Soils

This section is in two main parts. The first part lists the five factors of soil formation and discusses the effect these factors have had on soils in Fulton County. In the second part, the soil series are placed in their soil orders and great soil groups and the morphology of the soils of each series in the county is described.

Formation of Soils

Soils are natural bodies that form a continuum on the land surface. They have properties that result from the integrated effects of climate and plant and animal life acting upon parent material as influenced by relief over periods of time. All five of these factors come into play in the formation of a soil. The relative importance of each differs from place to place; sometimes one is more important and sometimes another. Climate and plant and animal life may vary little in a county, but there are many local differences in relief, parent material, and time, or age.

The interrelationships among the five factors are complex; the effects of any one factor are hard to determine. Nevertheless, in the paragraphs that follow, the five factors are discussed separately.

Climate.—Climate as a genetic factor affects the physical, chemical, and biological relationships in the soil, primarily through the influences of rainfall and temperature.

The soils in Fulton County formed under a climate similar to that of the present time. The average annual rainfall is 47.4 inches, and the average annual temperature is 58.6° F. The average growing season lasts 197 days. During an average winter the temperature is below freezing on about 8 days. During an average summer the temperature reaches 90° or above on about 55 days.

Throughout most of the year the soils are moist and subject to leaching. They have, therefore, a leached, acid

interpretations—Continued

Susceptibility to frost action	Erosion of cuts and fills	Soil limitations affecting—			Terraces and diversions
		Farm ponds ^a	Agricultural drainage	Irrigation ^a	
High.....	Severe.....	None.....	(Drainage not needed.)	No limitations; eroded soils have lower infiltration rate.	High erodibility.
High.....	Severe.....	None.....	(Drainage not needed.)	No limitations; eroded soils have lower infiltration rate.	High erodibility.
High.....	Severe.....	None.....	Outlets scarce.....	None.....	Wet material with seasonal high water table. (Terraces and diversions not needed).
High.....	Severe.....	Permeable substratum.....	(Drainage not needed.)	None.....	(Terraces and diversions not needed).
High.....	Severe.....	Permeable substratum.....	(Drainage not needed.)	None.....	(Terraces and diversions not needed).
Moderate....	Severe.....	Permeable substratum.....	(Drainage not needed.)	Low infiltration rate.....	(Terraces and diversions not needed).
Low.....	Moderate.....	In places permeable below 3 feet; unstable fill material.	Slow permeability....	Low infiltration rate.....	(Terraces and diversions not needed).
Low.....	Moderate.....	Permeable below 2 feet; unstable fill material.	Permeable below 2 feet.	Low infiltration rate.....	(Terraces and diversions not needed).
High.....	Severe.....	Permeable substratum.....	None.....	None.....	Wetness and overflow.
High.....	Severe.....	Highly permeable.....	Outlets are scarce....	None.....	Wetness and overflow.

^a Little acreage is suitable for surface irrigation with sprinkler systems.

surface soil and an illuviated subsoil. Rainwater percolating through the profile carries dissolved soil material and small particles, particularly clay particles, from the surface soil into the subsoil, or, in some instances, completely out of the soil. In this manner the subsoil accumulates clay minerals and iron and aluminum compounds. Some bases, as for example calcium, are carried out of the soil in the water, and the result is an acid soil. Soils that have recent alluvium as parent material do not show these changes because they have not been subjected to this leaching for a long enough time.

Plant and animal life.—Plants and animals—including micro-organisms and all other organisms that live on and in the soil—have an important effect on soil formation. They add organic matter to the soil and transfer elements from the subsoil to the surface soil. The animal life converts plant remains to organic matter. The organic matter imparts a dark color and granular structure to the surface soil.

Forest vegetation adds less organic matter to the soil than grass vegetation. Most of the soils in Fulton County formed under forest vegetation. Soils on the uplands have thin, organic and organic-mineral horizons; these soils formed under forests composed chiefly of upland oaks, poplar, hickory, black walnut, and other hardwoods. Soils on the flood plain of the Mississippi River also formed under hardwood forests—mostly bottom-land oaks, sweetgum, and cottonwood—but also under some cypress. These low-lying soils, however, have a surface soil that

is thick and dark. Earthworms, by continually mixing the soil, could account for this difference between the horizons of the two kinds of soils, or else, cane and grass-like plants have had more effect than assumed. The Patton soils, for instance, formed in silty alluvium under marsh plants or swamp forests and have thick, dark horizons of organic-mineral material.

Parent material.—All the soils in Fulton County formed in transported material. Soils on uplands developed in thick loess deposited by the wind. The loess is 40 to 60 feet thick in the bluff area and 15 or 20 feet thick in areas at the eastern edge of the county. Loess is 70 to 80 percent silt, 20 to 30 percent clay, and 1 to 2 percent fine sand. It is sometimes described as rock flour, or floury. Soils on flood plains associated with the uplands formed in alluvium washed from the loessial uplands, and, like the soils on uplands, are silty.

The soils of the Mississippi River flood plain formed in deposits laid down by the river. These deposits, of mixed origin, consist of material from all areas that are drained into the Mississippi River. The deposited alluvium ranges widely in texture. As the river overflows, sand is dropped first; then, as the current slows, mostly fine sand and silt are deposited. Low ridges thus formed are known as natural levees. In areas where water is left standing for some time the deposits are dominantly clay. These areas are known as slack-water flats.

Relief.—Relief influences the formation of soils primarily through its effect upon drainage and erosion.

None of the soils in Fulton County formed under excessive relief. Soil development has taken place at a more rapid rate than geologic erosion. On normal relief, well-drained soils formed that are representative of the Gray-Brown Podzolic great soil group.

On subnormal relief, runoff is slower than on normal and little material is lost through erosion. Soils of this county having such relief are moderately well drained and occur on nearly level to sloping uplands. They have a fragipan at a depth of about 2 feet.

On flat or concave relief, runoff is very slow and there is no natural erosion. Soils of this county having such relief are saturated with water during wet seasons; they are gray or mottled beneath the surface. On the uplands and stream terraces of loessal origin, the soils with such relief have a fragipan.

Time.—Less time is required for a soil to develop in humid, warm regions than in dry or cold regions. The oldest soils in Fulton County are rather young geologically. The loess of this county was deposited during

glaciation, 22,000 to 70,000 years ago. Many soils formed in parent material weathered from rocks have been in the process of development many times this long. The loessal soils of this county show comparatively strong horizon development, in contrast to that of the soils of the Mississippi River flood plain. On old natural levees that border former channels of the river, the soils show weak to moderate horizon development, but aside from these and the loessal soils, the soils in the county have very weak development because they were derived from recently deposited alluvium. These soils derived from alluvium have an accumulation of organic matter, and if poorly drained, are also gleyed. The accumulation of organic matter and gleying take place in a very short period of time.

Laboratory Analyses

Tables 8 and 9 show the results of laboratory analyses on 12 profiles. The analyses for table 8 were made by the Soil Survey Laboratory, Soil Conservation Service, Lin-

TABLE 8.—*Chemical and physical*

[Analyses by Soil Survey Laboratory, Soil Conservation Service, Lincoln, Nebr. See text for methods used]

Soil type and location	Horizon	Depth	Particle size distribution, in millimeters									Textural class	pH				
			Very coarse sand (2-1)		Coarse sand (1-0.5)		Medium sand (0.5-0.25)		Fine sand (0.25-0.10)		Very fine sand (0.10-0.05)		Silt (0.05-0.002)	Clay (<0.002)			
			Inches	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent			
Beulah fine sandy loam: 0.65 mile north of Western School.	Alp-----	0-9	<.1	0.1	0.1	0.3	17.7	44.9	31.2	5.8	87.6	5.4	vfsi-----	5.9			
	B11-----	9-17	<.1	.1	.1	.4	31.6	41.9	21.0	5.0	88.6	4.8	vfsi-----	6.0			
	B12-----	17-25	<.1	.1	.1	.3	31.2	45.6	17.8	5.0	90.7	3.1	vfsi-----	6.1			
	B2-----	25-28	<.1	.1	.1	.3	9.6	47.2	29.5	13.3	81.5	4.3	vfsi-----	6.1			
	C1-----	28-44	<.1	.1	.1	.4	10.7	52.7	31.4	4.7	89.5	4.7	vfsi-----	6.2			
	C2-----	44-57	<.1	.1	.1	.4	2.1	26.4	58.4	12.6	73.7	12.7	sil-----	5.6			
	C3-----	57-70	<.1	.2	.4	11.7	48.2	32.9	6.6	86.2	5.8	vfsi-----	5.3				
Beulah fine sandy loam: 50 feet north of dirt road and 0.38 mile west of State road 94, 700 feet south of Ridge Store.	Alp-----	0-8	<.1	.1	.1	.2	31.4	32.7	26.4	9.2	81.3	7.4	vfsi-----	6.1			
	B1-----	8-15	<.1	.1	.1	.3	46.6	42.0	6.5	4.6	90.9	1.2	fs-----	6.2			
	B21-----	15-27	<.1	.1	.1	.3	32.5	47.7	15.6	3.8	88.4	2.3	lfa-----	6.0			
	B22-----	27-34	<.1	.1	.1	.2	27.8	42.4	21.1	8.5	84.0	3.2	vfsi-----	6.0			
	C1-----	34-53	<.1	.1	.1	.3	74.5	18.4	4.7	2.1	78.6	1.0	fs-----	6.1			
	C2-----	53-70	<.1	.1	.1	.3	62.9	26.5	7.8	2.4	82.6	2.6	fs-----	6.1			
Calloway silt loam, terrace: $\frac{1}{2}$ mile south of Hickman County line on State road 239.	Ap-----	0-7	b 2.4	b 1.2	b 2	b 2	1.5	86.3	8.2	57.5	30.4	si-----	5.4				
	B2-----	7-13	b 1.4	b 1.5	b 4	b 4	1.4	83.1	11.8	50.8	33.9	si/sil-----	5.3				
	B3m1-----	13-21	b 1.9	b 1.4	b 4	b 4	1.5	78.1	16.3	45.5	34.3	sil-----	5.0				
	B3m2-----	21-29	b 4	b 9	b 4	b 7	b 1.5	67.0	29.1	37.4	31.5	sicl-----	5.0				
	B3m3-----	29-41	<.1	b 2	b 2	b 4	b 1.2	68.5	29.5	39.0	30.9	sicl-----	5.5				
	C11-----	41-50	<.1	b 1	b 1	b 2	b 1.3	73.4	24.9	44.4	30.4	sil-----	6.2				
	C12-----	50-64	<.1	b 1	b 1	b 3	b 1.4	78.1	20.0	46.5	33.2	sil-----	6.5				
Calloway silt loam, terrace: 1 mile east of Liberty Church on State road 166.	Ap-----	0-9	b 7	b 1.0	b 3	b 2	1.2	83.6	13.0	51.1	33.8	sil-----	5.1				
	B2-----	9-15	b 7	b 1.0	b 4	b 4	1.1	79.9	16.5	50.7	30.5	sil-----	4.7				
	B3m1-----	15-21	b 1.2	b 1.7	b 5	b 5	1.4	81.4	13.3	44.9	38.1	sil-----	5.0				
	B3m2-----	21-29	b 6	b 1.0	b 5	b 6	b 1.3	68.5	27.5	37.8	32.3	sicl/sil-----	5.1				
	B3m3-----	29-39	b 2	b 6	b 3	b 4	b 1.2	70.1	27.2	38.7	32.8	sicl/sil-----	5.1				
	B3m3-----	39-46	b 1	b 5	b 3	b 4	b 1.1	74.1	23.5	45.0	30.4	sil-----	5.3				
	C-----	46-64	<.1	b 2	b 2	b 4	b 1.3	78.6	19.3	47.7	32.4	sil-----	6.0				

See footnotes at end of table.

coln, Nebr. Data for table 9 were obtained by the Agricultural Experiment Station, Department of Agronomy, University of Kentucky, Lexington, Ky. (3).

Briefly described here are the methods and procedures used in compiling some of the data shown in tables 8 and 9. An italic number in parentheses following the name of the method or procedure indicates the publication (listed in Literature Cited, on page 68) that contains a discussion of that method or procedure. All data are reported on an oven-dry basis.

Particle size distribution analysis (table 8): Pipette method (4,5).

Particle size distribution analysis (table 9): Hydrometer method (2).

pH (table 8): Glass electrode method—determined by means of a Beckman pH meter using a soil-water ratio of 1:1 (1:5 if horizons were organic) (7, 10).

Organic matter and exchangeable cations (tables 8 and 9): Macro method (7). A 77.0 percent recovery factor was used to calculate the organic carbon percentage given

in table 8. The procedures followed in determining exchangeable cations for table 8 deviated from the normal in the following ways.

1. A 25-gram soil sample and 250 milliliters of ammonium acetate were used for leaching the soil in the extraction of cations.
 2. A cerate titration for calcium was used rather than the permanganate method.
 3. Sodium and potassium were determined by flame spectrophotometry.

Bulk density (table 8): Clods that were 1.5 to 2 inches wide and coated with a Seran solution were used to measure bulk density. The volume of the clods was measured by displacement in water; the oven-dry weight was used to calculate the bulk density. The volume was determined, first, at the moisture content of the clods when received in the laboratory; next, when the clods had been moistened by adsorption after going from air dryness to a constant weight on a sand capillary column under 30 centimeters water tension; and, finally, when the clods were oven dry.

characteristics of some representative soils

[to obtain data on particle size distribution, pH, organic carbon, extractable cations, and bulk density]

Organic matter				Extractable cations (Meq. per 100 gm. of soil)										Bulk density			
Organic carbon	Nitrogen	C/N	Free iron oxide (Fe ₂ O ₃)	Moisture held at tension of 15 atmospheres	Cation exchange capacity (NH ₄ OAc)	Ca	Mg	H	Na	K	Base saturation (NH ₄ OAc exchange)	Base saturation (sum of cations)	Air dry	30 cm. water tension	Oven dry		
Percent	Percent	Percent	Percent	Percent	Meq./100 gm.						Percent	Percent	Percent	Percent	Percent	Percent	Percent
0.43	0.041	10	0.6	3.2	6.8	4.4	1.1	2.8	0.1	0.5	88	68	-	-	-	-	-
.24	.027	9	.7	3.4	6.9	5.2	1.1	3.3	.1	.3	96	67	-	-	-	-	-
.13	.016	8	.7	2.7	6.1	4.3	1.1	1.9	.1	.2	92	75	-	-	-	-	-
.32	-	-	.9	6.9	12.3	9.0	1.9	4.5	.1	.4	93	72	-	-	-	-	-
.14	-	-	.7	3.2	6.8	5.2	1.2	2.1	.1	.2	97	76	-	-	-	-	-
.20	-	-	1.0	6.8	12.4	7.8	2.4	5.2	.1	.5	87	68	-	-	-	-	-
.10	-	-	.8	4.1	8.0	4.7	1.3	3.6	.1	.4	81	64	-	-	-	-	-
.48	.049	10	.7	4.8	8.5	6.5	1.2	2.8	.1	.3	94	74	-	-	-	-	-
.14	.018	8	.6	2.4	5.3	3.8	1.1	2.4	.1	.2	96	68	-	-	-	-	-
.09	.016	6	.6	2.9	5.6	4.0	1.1	1.9	.1	.2	95	74	-	-	-	-	-
.15	-	-	.8	4.5	8.4	5.9	1.5	2.6	.1	.2	92	75	-	-	-	-	-
.06	-	-	.5	2.0	3.9	2.9	.8	1.2	.1	.1	97	76	-	-	-	-	-
.05	-	-	.6	2.2	4.4	3.2	.8	1.6	.1	.1	95	72	-	-	-	-	-
.62	.068	9	1.6	4.4	6.2	3.0	1.0	4.7	.1	.2	68	47	-	-	-	-	-
.22	.031	7	1.5	5.7	7.1	3.6	1.5	4.5	.1	.1	75	54	7.0	1.43	27.1	1.36	1.40
.10	.024	4	2.1	7.2	9.4	3.3	3.2	6.4	.1	.2	72	52	4.4	^d 1.59	23.7	1.49	^d 1.58
.12	.031	4	2.1	13.6	17.9	6.2	8.6	7.9	.2	.4	86	66	-	-	-	-	-
.12	-	-	1.8	13.9	19.3	7.8	11.1	5.5	.2	.4	101	78	4.3	1.66	27.4	1.48	^d 1.68
.11	-	-	1.8	12.2	17.3	7.4	10.0	3.8	.2	.4	104	82	-	-	-	-	-
.07	-	-	1.6	10.7	15.8	7.3	8.3	3.6	.2	.4	102	82	5.4	1.53	30.1	1.42	1.56
.74	.083	9	1.3	5.6	7.7	2.9	1.1	7.4	.1	.2	56	37	-	-	-	-	-
.19	.037	5	1.7	7.3	8.4	2.1	1.0	8.8	.1	.2	40	28	3.4	1.58	25.6	1.50	1.58
.09	.026	3	2.2	7.1	8.8	1.2	1.5	8.8	.2	.2	35	26	5.7	1.64	24.3	1.58	1.67
.12	.031	4	2.0	13.7	16.9	2.6	5.3	13.2	.7	.3	53	40	4.6	1.66	24.6	1.52	1.68
.10	-	-	1.8	13.6	17.7	3.7	6.8	11.0	1.0	.3	67	52	4.5	1.62	28.4	1.43	1.64
.06	-	-	1.9	13.0	17.6	4.8	7.4	7.9	1.2	.4	78	64	-	-	-	-	-
.10	-	-	1.9	11.4	15.8	5.8	7.6	5.3	1.2	.4	95	74	4.2	1.55	31.2	1.38	1.57

TABLE 8.—*Chemical and physical*
[Analyses by Soil Survey Laboratory, Soil Conservation Service, Lincoln, Nebr. See text for methods used]

Soil type and location	Horizon	Depth	Particle size distribution, in millimeters									Textural class	pH						
			Very coarse sand (2-1)			Coarse sand (1-0.5)			Medium sand (0.5-0.25)			Fine sand (0.25-0.10)		Very fine sand (0.10-0.05)		Silt (0.05-0.002)			
			Inches	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Clay (<0.002)	II (0.2-0.02)	III (0.02-0.002)			
Dundee silty clay loam: ¾ mile west of State road 311, ½ mile north of Tennessee line.	Alp	0-4	Percent	° 0.1	° 3.5	Percent	° 1.8	° 4.0	° 9.3	53.2	28.1	24.5	40.9	sicl	5.7				
	B1	4-9	Percent	° 1	° 2.0	Percent	° 1.2	° 2.9	° 7.3	52.8	33.7	20.7	41.5	sicl	5.6				
	B21	9-17	Percent	< 1	° 3	Percent	° 3	° 1.4	° 11.7	41.3	45.0	26.6	27.5	sic	4.9				
	B22	17-23	Percent	° 2	° 2	Percent	° 3	° 2.2	° 23.0	39.7	34.4	48.1	16.4	cl	4.9				
	B3	23-40	Percent	< 1	° 2	Percent	° 5	° 2.4	° 25.0	46.5	25.4	57.8	15.3	1	5.2				
	C	40-45	Percent	° 1	° 5	Percent	° 2.6	° 21.4	° 14.1	36.7	24.6	45.0	18.3	1	5.2				
	D	45-70	Percent	< 1	.1	Percent	.5	41.4	44.1	8.9	5.0	88.0	2.7	lfs	5.5				
Dundee silty clay loam: ¼ mile east of State road 311, ½ mile north of Tennessee line.	Alp	0-6	Percent	< 1	b. 2	Percent	b. 3	b. 1.5	f. 2.0	54.0	42.0	10.6	46.4	sic	6.3				
	B1	6-12	Percent	< 1	b. 1	Percent	b. 3	b. 1.1	b. 1.3	43.4	53.8	7.7	37.7	sic	4.7				
	B21	12-25	Percent	< 1	b. 1	Percent	b. 3	b. 2.5	b. 5.5	41.1	50.5	21.4	27.1	sic	4.5				
	B22	25-33	Percent	< 1	b. 1	Percent	b. 1.1	b. 17.6	b. 19.4	28.9	32.9	47.4	15.1	cl	4.7				
	B3	33-42	Percent	< 1	b. 2	Percent	b. 2.1	30.0	29.6	17.0	21.1	64.0	6.3	scl	5.0				
	D1	42-59	Percent	< 1	.4	Percent	13.7	44.7	22.6	10.9	7.7	51.4	3.6	lfs	5.4				
Patton silt loam: ⅓ mile east of State road 289 on State road 116.	Alp	0-8	b. 1	b. 3	b. 1	b. 2	b. 2	b. 1.3	81.6	16.4	50.5	32.5	sil	5.9					
	A12	8-17	b. 1	b. 1	b. 1	b. 1	b. 2	b. 1.1	79.3	19.1	49.1	31.4	sil	6.1					
	A13	17-23	b. 3	b. 4	b. 2	b. 2	b. 2	b. 1.1	79.2	18.6	49.3	31.1	sil	6.3					
	Bg	23-37	b. 4	b. 4	b. 2	b. 2	b. 2	b. 1.0	71.5	26.3	38.8	33.8	sil	6.6					
	Cg1	37-50	b. 3	b. 5	b. 2	b. 2	b. 2	b. 1.0	74.9	22.9	41.4	34.6	sil	7.0					
	Cg2	50-63	b. 5	b. 8	b. 3	b. 4	b. 4	b. 1.0	77.0	20.0	44.3	33.9	sil	7.1					
Patton silt loam: ⅔ mile south of State road 94, first road east of Mud Creek Bridge, 4½ miles east of Hickman.	Alp	0-10	b. 2	b. 3	b. 1	b. 2	b. 2	b. 1.2	80.8	17.2	47.4	34.7	sil	6.3					
	A12	10-16	b. 3	b. 6	b. 3	b. 4	b. 4	b. 1.3	75.0	22.1	45.3	31.2	sil	6.5					
	Bg1	16-21	b. 2	b. 5	b. 4	b. 5	b. 5	b. 1.1	68.6	28.7	40.7	29.3	sicl	6.6					
	Bg2	21-27	b. 1	b. 2	b. 2	b. 4	b. 4	b. 1.0	66.8	31.3	39.2	28.8	sicl	6.7					
	Cg1	27-46	b. 2	b. 3	b. 2	b. 4	b. 4	b. 1.4	73.6	23.9	43.9	31.3	sil	7.1					
	Cg2	46-65	< 1	b. 3	b. 3	b. 4	b. 4	b. 1.5	78.8	18.7	47.4	33.1	sil	7.1					
Sharkey silty clay: 150 feet north of State road 925, 500 feet west of Owens Slough.	Alp1	0-4	< 1	< 1	b. 1	b. 1	b. 4	b. 8	58.3	40.3	10.1	49.3	sic/sicl	6.5					
	Alp2	4-8	< 1	< 1	b. 1	b. 1	b. 3	b. 5	57.4	41.7	9.2	48.9	sic	6.6					
	Cg1	8-13	< 1	< 1	b. 1	b. 1	b. 3	b. 7	52.7	46.2	10.0	43.6	sic	6.8					
	Cg2	13-31	b. 1	b. 2	b. 2	b. 5	b. 5	b. 1.0	52.0	46.0	14.4	38.9	sic	6.6					
	Cg3	31-49	b. 1	b. 3	b. 3	b. 8	b. 8	b. 1.5	47.6	49.4	14.3	35.3	sic	6.7					
	Cg4	49-69	< 1	b. 2	b. 2	b. 5	b. 5	b. 1.0	48.1	50.0	14.6	34.8	sic	7.0					
Sharkey silty clay: 500 feet west of State road 94, ⅔ mile north of Tennessee line.	Alp	0-4	< 1	b. 3	b. 6	b. 1.6	b. 1.3	b. 5	48.5	47.7	8.2	42.5	sic	5.7					
	Alp2	4-8	< 1	b. 2	b. 3	b. 1.5	b. 1.2	b. 7	49.7	7.5	41.7	41.7	sic	5.9					
	Cg1	8-14	< 1	b. 1	b. 3	b. 9	b. 7	b. 4	49.4	48.6	7.7	42.9	sic	5.1					
	Cg2	14-28	< 1	b. 3	b. 4	b. 8	b. 6	b. 3	49.3	48.6	9.0	41.3	sic	5.1					
	Cg3	28-43	< 1	b. 2	b. 3	b. 4	b. 5	b. 2	50.0	48.6	11.2	39.5	sic	5.6					
	Cg4	43-65	< 1	b. 1	b. 1	b. 2	b. 2	b. 2	47.8	51.6	6.6	41.5	sic	7.2					

^a Few mica flakes.^b Many Fe-Mn? concretions.^c Common Fe-Mn? concretions.^d Duplicate clods exceed confidence limit of ± 0.005 gram per cubic centimeter and range to ± 0.10 gram per cubic centimeter.

characteristics of some representative soils—Continued

to obtain data on particle size distribution, pH, organic carbon, extractable cations, and bulk density.]

Organic matter			Free iron oxide (Fe ₂ O ₃)	Moisture held at ten- sion of 15 atmos- pheres	Cation exchange ca- pacity (NH ₄ OAc)	Extractable cations (Meq. per 100 gm. of soil)					Bulk density				
Organic carbon	Nitrogen	C/N				Ca	Mg	H	Na	K	Base saturation (NH ₄ OAc exchange)	Base saturation (sum of cations)	Air dry	30 cm. water tension	Oven dry
Percent	Percent	Percent	Percent	Percent	Meq./100gm.	14.0	3.3	7.9	0.1	0.6	Percent	Percent	Air dry	30 cm. water tension	Oven dry
1.56	0.138	11	1.6	11.9	20.2	14.0	3.3	7.9	0.1	0.6	89	69	—	—	—
1.21	.119	10	1.6	14.9	22.3	15.4	4.6	9.1	.1	.6	93	69	3.8	1.67	23.5
.66	.073	9	1.6	14.9	28.0	17.1	5.3	12.8	.2	.8	84	65	5.4	1.70	27.0
.38	.048	8	1.2	15.0	22.4	12.8	5.1	10.4	.2	.6	83	64	—	—	—
.23	.036	6	1.2	11.8	17.9	11.4	4.1	7.0	.2	.5	90	70	3.0	1.59	26.2
.22	—	—	1.2	10.9	16.9	10.9	4.2	6.5	.2	.5	93	71	—	—	—
.08	—	—	.7	2.8	6.0	3.9	1.7	2.4	.1	.2	98	71	—	—	—
1.82	.167	11	2.1	19.4	25.5	21.7	4.5	7.5	.1	1.0	107	78	—	—	—
.66	.074	9	1.9	22.1	29.8	16.5	5.7	17.2	.1	.9	78	57	1.4	1.68	—
.40	.048	8	1.7	21.6	29.8	12.4	5.8	19.4	.1	.8	64	50	6.2	1.74	—
.25	—	—	1.3	13.4	20.4	9.5	4.6	10.3	.1	.6	72	59	3.2	1.79	22.9
.17	—	—	.9	8.7	14.2	7.9	3.6	5.7	.1	.4	84	68	—	—	—
.07	—	—	.6	3.6	6.0	3.6	1.7	2.6	.1	.2	93	68	—	—	—
1.28	.117	11	1.0	7.9	15.0	9.6	4.0	5.2	.1	.4	94	73	5.1	1.56	23.9
1.02	.093	11	.7	10.0	18.3	12.0	5.6	4.5	.1	.3	98	80	2.9	1.48	28.0
.73	.070	10	1.1	8.9	16.1	10.0	5.6	3.6	.1	.3	99	82	—	—	—
.32	—	—	1.6	13.5	21.2	12.3	8.7	3.1	.1	.5	102	87	3.8	1.72	25.6
.17	—	—	1.5	11.8	20.4	12.1	8.9	2.2	.1	.5	106	91	—	—	—
.13	—	—	1.2	10.2	17.7	10.7	7.7	2.4	.1	.4	107	89	2.6	1.65	26.3
1.42	.121	12	1.0	8.8	17.4	13.4	3.9	4.3	.1	.3	102	80	4.0	1.56	25.9
1.03	.086	12	1.0	11.1	19.3	14.2	4.5	4.6	.1	.3	99	80	3.7	1.58	32.0
.68	.065	10	1.2	13.9	22.2	14.8	7.9	3.8	.1	.4	104	86	—	—	—
.46	.049	9	1.1	15.3	24.3	16.3	9.6	3.4	.1	.4	109	88	3.9	1.62	27.4
.31	—	—	1.3	11.9	20.9	14.1	8.6	2.2	.1	.3	110	91	—	—	—
.17	—	—	1.5	10.0	17.3	11.2	7.1	1.9	.1	.5	109	91	2.6	1.64	26.4
1.54	.134	11	2.2	16.5	25.5	20.3	6.5	5.8	.1	.8	109	83	—	—	—
1.48	.134	11	2.2	18.3	25.6	21.0	5.8	5.8	.1	.8	108	83	4.5	1.76	—
1.44	.136	10	2.0	21.7	28.8	25.9	6.2	5.1	.2	.8	115	87	4.8	1.66	—
1.10	.107	10	2.0	22.4	30.0	25.5	7.0	6.0	.2	1.0	112	85	7.6	1.72	—
.71	—	—	2.1	21.2	30.7	25.7	7.9	5.1	.2	1.1	114	87	—	—	—
.46	—	—	1.8	22.5	30.5	26.4	7.1	3.9	.3	1.0	114	90	—	—	—
1.91	.182	10	2.4	20.0	28.1	20.8	8.4	10.7	.1	1.1	108	74	—	—	—
1.66	.163	10	2.4	22.2	27.9	20.7	6.7	10.4	.2	1.0	102	73	4.6	1.75	—
.74	.087	8	2.0	21.4	27.6	16.3	7.0	12.8	.4	.8	89	66	4.3	1.69	—
.51	.068	8	1.8	19.9	28.3	15.7	8.0	11.3	.7	1.0	90	69	—	—	—
.43	—	—	1.4	20.9	31.7	19.7	11.0	8.2	1.4	1.0	104	80	—	—	—
.44	—	—	1.6	22.0	38.1	23.0	14.4	3.2	2.1	.9	106	93	—	—	—

* Few Fe-Mn? concretions.
† Single clod determination.

‡ Duplicate clods exceed the confidence limit of ± 0.005 gram per cubic centimeter and ranges to ± 0.07 gram per cubic centimeter.

TABLE 9.—*Chemical and physical*

[Analyses by the Agricultural Experiment Station, Department of Agronomy, University of Kentucky, Lexington, Ky.]

Soil type and location	Horizon	Depth	pH	Organic matter	Soluble phosphorus	Cation exchange capacity
Memphis silt loam: 5½ miles east of Hickman and 2½ miles west of Cayce.	A1.....	Inches 0-2	6.6	Percent 6.14	Parts per million 28.6	Meg./100 gm. 13.42
	A2.....	2-10	4.5	1.20	10.7	6.14
	B21.....	10-17	5.3	.29	40.4	7.00
	B22.....	17-27	5.1	.41	42.7	14.50
	B23.....	27-36	5.1	.26	44.3	16.15
	C1.....	36-46	5.1	.16	35.6	14.58
	C2.....	46-60	5.0	.11	27.9	15.18
Loring silt loam: 100 yards south of U.S. bypass, 300 yards west of railroad yard. North side of Fulton.	A1.....	0-7	4.5	1.48	3.8	6.04
	A2.....	7-11	4.9	.20	12.2	6.67
	B1.....	11-16	4.9	.42	6.4	11.32
	B21.....	16-27	5.0	.47	7.2	12.32
	B22.....	27-34	5.0	.14	42.8	16.61
	B3m1.....	34-38	4.8	.21	34.3	13.84
	B3m2.....	38-45	4.9	.13	37.2	12.70
	B3m3.....	45-52	4.7	.08	34.3	12.33
	C1.....	52-60	4.6	.11	38.6	11.44
	C2.....	60-72	5.3	.01	32.3	12.89

Morphology and Classification of the Soils

One of the objectives of a soil survey is to develop a taxonomic classification that will show the relationship of the soils in an area to one another and to soils in other areas. Such a classification, based on common characteristics, is necessary because there are so many kinds of soils that it would be difficult to remember the characteristics of all of them. If soils are placed in a few groups, each group having selected characteristics in common, their general nature can be remembered more easily.

In the comprehensive system of soil classification currently followed in the United States (13, 14), soils are placed in six categories. Beginning with the highest, the six categories are as follows: order, suborder, great soil group, family, series, and type. In the highest category, all the soils in the county are grouped into three orders—zonal, intrazonal, and azonal—whereas thousands of soil types are recognized in the lowest category. The categories of suborder and family have never been fully developed and thus have been little used. Attention has been given mainly to the classification of soils into soil types and series within counties or comparable areas and to the subsequent grouping of series into great soil groups and soil orders.

The lower categories of taxonomic soil classification, the series and types, are explained in the section "How Soils Are Named, Mapped, and Classified." The soil phase, a subdivision of the soil type made on the basis of factors significant in management but not significant in taxonomic classification, is also explained in that section.

In table 10 the soil series of this county are arranged by orders and great soil groups, and some distinguishing characteristics of each soil series are shown. Following

the table, the characteristics of each order, great soil group, and series are described in detail. A representative profile of a soil in each series, and the permissible range of characteristics for each series, are given.

Unless indicated otherwise, the colors described in the profiles are those of a moist soil. When the soil material is dry, the color values are one or two units higher than when the soil is moist.

Zonal soils

The zonal order consists of soils having well-developed, genetically related horizons that reflect the influence of climate and living organisms in their formation. Generally, these soils are well drained, and their parent material is not extreme in either texture or composition. The only zonal soils in Fulton County are those in the Gray-Brown Podzolic great soil group, and they occupy about 40 percent of the county.

GRAY-BROWN PODZOLIC SOILS

In this great soil group are zonal soils that developed under deciduous forest in a humid, temperate climate. These soils have a thin layer of organic material that overlies a thin, dark layer of organic-mineral material. Below that is a grayish-brown, leached layer that rests upon a brown, illuviated layer. Gray-Brown Podzolic soils occupy about 40 percent of the county.

Memphis soils are representative of the Gray-Brown Podzolic group. Memphis soils are well drained; they developed in thick loessial deposits on the uplands. Their slope range is 0 to 65 percent. In a virgin profile of these soils, the A horizon consists of a thin organic layer and a dark organic-mineral layer on top of a layer of leached

characteristics of some representative soils

See text for methods used to obtain data on organic matter, cation exchange capacity, and particle size distribution]

Exchangeable cations (Meq. per 100 gm. of soil)					Base saturation	Particle size distribution						
Ca	Mg	K	Na	H		Sand 1 mm. to 50μ	Silt 50μ to 2μ	Clay			Total clay	
								2μ to 0.2μ	0.2μ to 0.08μ	$>0.08\mu$		
6.75	1.33	0.82	0.04	3.48	Percent	Percent	Percent	Percent	Percent	Percent	Percent	
1.13	.30	.33	.08	3.10	74.0	39.7	2.70	83.36	9.82	1.59	2.53	13.94
2.25	1.08	.38	.04	3.25	53.5							
4.10	2.45	.73	.09	7.12	60.9		2.44	67.47	13.48	8.61	8.00	30.09
6.25	2.92	.69	.07	6.22	61.5							
6.00	2.21	.46	.04	6.17	58.6							
5.88	2.25	.38	.04	6.63	56.4		2.00	72.87	10.15	6.46	6.52	25.13
.63	0	.17	.07	5.17	14.4							
1.38	.45	.22	.07	4.74	30.9		3.79	81.97	9.34	3.11	1.79	14.24
3.23	2.25	.32	.07	5.63	52.0							
4.00	3.50	.32	.07	4.43	64.0							
6.25	3.37	.77	0	5.13	67.1		4.37	77.37	8.97	5.34	3.95	18.26
3.13	3.42	.28	.11	6.00	60.1							
3.13	4.12	.26	.07	5.10	59.8							
2.63	3.17	.26	.07	6.20	49.6							
2.50	3.00	.23	.12	5.59	51.1							
5.63	1.37	.13	.13	5.43	57.3		1.79	81.50	6.64	6.23	3.84	16.71

soil material. For the most part, these three subhorizons have been intermixed by cultivation to form an Ap horizon. The A horizon is silt loam. The B2 horizon is silty clay loam. Laboratory data (see table 9) show that there is twice as much clay in the B horizon as in the A horizon. Because of the uniform texture of the loessial deposits from which these soils formed, there is little doubt that translocation of clay from the A horizon to the B horizon has taken place. Continuous clay films are on most ped surfaces in the B horizon. Laboratory data also show base saturation to be more than 50 percent in all horizons except the A horizon. The C horizon is silt loam, and in the bluffs where deep cuts can be studied, the loess is calcareous below a depth of 20 feet.

Memphis series.—The following is a representative profile of Memphis silt loam, 2 to 6 percent slopes, in a moist, cultivated area.

A_p—0 to 8 inches, brown (10YR 4/3) silt loam; weak, fine and medium, granular structure; very friable; abundant, small roots; strongly acid; abrupt, smooth boundary. 6 to 10 inches thick.

B₁—8 to 13 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, subangular blocky structure; friable; abundant, small roots; strongly acid; clear, smooth boundary. 3 to 7 inches thick.

B₂—13 to 26 inches, brown (7.5YR 4/4) silty clay loam; moderate, fine and medium, angular blocky structure; thin, continuous clay films; firm; common, small roots; very strongly acid; gradual, smooth boundary. 10 to 20 inches thick.

B₂—26 to 36 inches, brown (7.5YR 4/4) light silty clay loam; moderate, fine and medium, angular blocky structure; few to common clay films; friable to firm; few, brown (10YR 5/3) silt coatings; very strongly acid; gradual, smooth boundary. 6 to 14 inches thick.

B₃—36 to 45 inches, brown (7.5YR 4/4) to dark yellowish-brown (10YR 4/4) heavy silt loam; weak, fine and

medium, subangular blocky structure; friable; common, pale-brown (10YR 6/3) silt coatings; very strongly acid; gradual, smooth boundary. 5 to 12 inches thick.

C—45 to 60 inches +, dark yellowish-brown (10YR 4/4) silt loam; common, fine and medium, faint mottles of light brownish gray (10YR 6/2); massive; friable to very friable; very strongly acid. Several feet thick.

Range in characteristics: The A_p horizon ranges from dark brown (10YR 3/3) to brown (10YR 5/3). Some profiles do not have a B₁ horizon, and the B₂ horizon is frequently absent. The B₁ and B₂ horizons range from reddish brown to dark yellowish brown. In some profiles, the C horizon is free of mottles, but in others, it has many coarse mottles. The C horizon ranges from 10 to 50 feet in thickness and, in places, is calcareous below a depth of 20 feet.

Dundee and Dubbs soils are in the Gray-Brown Podzolic great soil group. These soils developed in stratified material on old natural levees that border former channels of the Mississippi River. Nearly all of these soils are cropped. No evidence of an A₂ horizon was found. These soils appear to be younger than Memphis soils, and their horizons are not so well defined.

The Dundee soils are moderately well drained to somewhat poorly drained. Their slope range is 0 to 3 percent. Translocation of clay from one horizon to another is evidenced by the presence of continuous clay films on ped surfaces in the B horizon. Laboratory data (see table 8 on page 50) show that in one profile the B21 horizon has about 17 percent more clay than the A horizon. In another profile, however, the difference was only 8 percent. The solum is underlain by sandy material.

Dundee series.—The following is a representative profile of Dundee silty clay loam in a moist, cultivated area.

A_p—0 to 6 inches, very dark grayish-brown (10YR 3/2) light silty clay loam; moderate, fine, granular structure;

TABLE 10.—*Characteristics and*

Order, great soil group, and soil series	Brief profile description	Position
Zonal Order Gray-Brown Podzolic soils: Central concept— Memphis.....	Brown silt loam over brown silty clay loam.....	Upland.....
With some properties of Prairie soils— Bosket.....	Very dark grayish-brown silt loam over silty clay loam; underlain by coarser textured material.	Terrace.....
Dubbs.....	Very dark grayish-brown silt loam over silty clay; underlain by coarser textured material.	Terrace.....
Dundee.....	Very dark grayish-brown silty clay loam over yellow or grayish-brown silty clay that grades to dark gray; underlain by coarser textured material at a depth of 30 to 36 inches.	Terrace.....
With fragipans— Grenada.....	Brown silt loam over yellowish-brown silt loam; underlain at a depth of 2 feet by a grayish fragipan that is firm and brittle.	Upland.....
Loring.....	Brown silt loam over brown silty clay loam; underlain at a depth of 32 inches by a weak fragipan with brownish mottles.	Upland.....
Intrazonal Order Planosols: Calloway.....	Dark grayish-brown silt loam over silt loam, mottled with yellowish brown; underlain at a depth of 17 inches by a firm and brittle fragipan of grayish silt loam or silty clay loam.	Upland or terrace.....
Henry.....	Thin, very dark gray silt loam over grayish silt loam; underlain by a firm and brittle, grayish fragipan at a depth of 14 inches.	Upland or terrace.....
Humic Gley soils: Patton.....	Thick, very dark grayish-brown or black silt loam over grayish silty clay loam; underlain by mottled, grayish or olive silt loam.	Low terrace.....
Low-Humic Gley soils: Birds.....	Mottled, grayish-brown silt loam over mottled, grayish silt loam.	Bottom land.....
Forestdale.....	Very dark grayish-brown silty clay loam over grayish clay; underlain by coarser material at a depth of 40 to 50 inches.	Low terrace.....
Waverly.....	Thin, mottled, grayish-brown silt loam underlain by silt loam mottled with gray.	Bottom land.....
Grumusols: With some properties of Alluvial soils— Sharkey.....	Very dark grayish-brown silty clay over grayish clay that is more than 3 feet thick.	Bottom land.....
Tunica.....	Very dark grayish-brown silty clay over grayish clay; underlain by coarser material at a depth of 2 to 3 feet.	Bottom land.....
Azonal Order Alluvial soils: Central concept— Adler.....	Brown silt loam, mottled at a depth of 20 inches and gleyed at 30 inches.	Bottom land.....
Beulah.....	Very dark grayish-brown fine sandy loam over brownish fine sandy loam or loamy fine sand.	Terrace.....
Collins.....	Brown silt loam, mottled at a depth of 20 inches and gleyed at 30 inches.	Bottom land.....
Commerce.....	Very dark grayish-brown silt loam underlain by grayish, mottled silt loam; gleyed at a depth of 14 to 24 inches.	Bottom land.....
Crevasse.....	Dark grayish-brown loamy fine sand over fine sand....	Bottom land.....
Robinsonville.....	Very dark grayish-brown silt loam underlain by sandy material at a depth of 2 feet.	Bottom land.....
With some properties of Low-Humic Gley soils— Falaya.....	Mottled, brown silt loam underlain at a depth of 15 inches by mottled, grayish silt loam; acid reaction.	Bottom land.....
Wakeland.....	Mottled, brown silt loam underlain at a depth of 15 inches by mottled, gray silt loam; neutral reaction.	Bottom land.....

genetic relationships of soil series

Soil drainage	Slope range	Parent material	Degree of profile development
Well drained-----	<i>Percent</i> 0 to 65	Loess-----	Moderate.
Well drained-----	0 to 4	Alluvium deposited by the Mississippi River-----	Weak.
Well drained to moderately well drained-----	0 to 4	Alluvium deposited by the Mississippi River-----	Weak.
Moderately well drained to somewhat poorly drained-----	0 to 4	Alluvium deposited by the Mississippi River-----	Weak to moderate.
Moderately well drained-----	0 to 12	Loess-----	Strong.
Well drained to moderately well drained-----	0 to 20	Loess-----	Moderate.
Somewhat poorly drained-----	0 to 6	Loess-----	Strong.
Poorly drained-----	0 to 2	Loess-----	Strong.
Very poorly drained-----	0 to 2	Neutral silty alluvium from loess-----	Weak.
Poorly drained-----	0 to 2	Recent alluvium from loess-----	Very weak.
Somewhat poorly drained to poorly drained-----	0 to 4	Alluvium deposited by the Mississippi River-----	Weak.
Poorly drained-----	0 to 2	Recent alluvium from loess-----	Very weak.
Poorly drained-----	0 to 1	Alluvium deposited by the Mississippi River-----	Very weak.
Somewhat poorly drained-----	0 to 2	Alluvium deposited by the Mississippi River-----	Very weak.
Moderately well drained-----	0 to 4	Alluvium from calcareous loess-----	Very weak.
Somewhat excessively drained-----	0 to 4	Alluvium deposited by the Mississippi River-----	Weak.
Moderately well drained-----	0 to 4	Acid alluvium from loess-----	Very weak.
Moderately well drained to somewhat poorly drained-----	0 to 2	Alluvium deposited by the Mississippi River-----	Very weak.
Excessively drained-----	0 to 4	Alluvium deposited by the Mississippi River-----	Very weak.
Well drained to moderately well drained-----	0 to 2	Alluvium deposited by the Mississippi River-----	Very weak.
Somewhat poorly drained-----	0 to 2	Acid alluvium from loess-----	Very weak.
Somewhat poorly drained-----	0 to 2	Alluvium from calcareous loess-----	Very weak.

- friable; abundant, small roots; slightly acid; abrupt, smooth boundary. 4 to 8 inches thick.
- B₁—6 to 12 inches, dark yellowish-brown (10YR 3/4) silty clay; few, fine, faint mottles of grayish brown (10YR 5/2); strong, medium, subangular blocky structure; continuous clay films; firm; common, dark-brown concretions; abundant, small roots; slightly acid; clear, smooth boundary. 4 to 8 inches thick.
- B₂—12 to 20 inches, dark grayish-brown (10YR 4/2) silty clay to clay; few, fine, distinct mottles of brown (7.5YR 4/4); moderate, medium, blocky and subangular blocky structure; continuous clay films; firm to very firm; common, dark-brown or black concretions; abundant, small roots; medium acid; clear, smooth boundary. 6 to 12 inches thick.
- B₂—20 to 30 inches, silty clay loam with dark-gray (10YR 4/1) ped surfaces and mottled, dark-gray (10YR 4/1) to grayish-brown (2.5Y 5/2) and brown (7.5YR 4/4) ped interiors; mottles are fine and distinct; moderate, medium, subangular blocky structure; continuous clay films; firm; common, dark-brown or black concretions; plentiful, small roots; medium acid; clear, smooth boundary. 8 to 15 inches thick.
- B₃—30 to 40 inches, dark-gray (10YR 4/1) to grayish-brown (2.5Y 5/2) loam; many, medium, distinct mottles of brown (7.5YR 4/4) or dark yellowish brown (10YR 4/4); weak, medium, blocky structure; few, patchy clay films; common, dark-brown or black concretions; plentiful, small roots; medium acid; clear, smooth boundary. 6 to 15 inches thick.
- D₁—40 to 50 inches +, grayish-brown (2.5Y 5/2) and dark yellowish-brown (10YR 3/4) fine sandy loam with medium, distinct mottles; massive; very friable; medium acid.

Range in characteristics: Some profiles do not have a B₁ horizon. In some profiles there is an A₁ horizon 4 to 8 inches thick. The B₂ horizon ranges from dark grayish brown (10YR 4/2) to dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2), with common, medium, faint mottles or ped interiors of dark grayish brown. The B₃ horizon ranges from loam to fine sandy clay loam. The B₁ and D horizons are absent from some profiles. In their place is a layer of silt loam that extends to a depth of 48 inches. Reaction ranges from strongly acid to neutral.

The Dubbs soils are well drained to moderately well drained. Their slope range is 0 to 4 percent. The continuous clay films on ped surfaces in the B horizon indicate that clay is carried down from one horizon to another. Laboratory data from other States show that the B horizon has from 10 to 20 percent more clay than the A horizon. The B horizon in the Dubbs soils is not as thick nor so well developed as that in the Dundee soils.

Dubbs series.—The following is a representative profile of Dubbs silt loam in a moist, cultivated area.

- A_p—0 to 6 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; very friable; abundant, small roots; slightly acid; clear, smooth boundary. 5 to 8 inches thick.
- B₁—6 to 14 inches, dark-brown (10YR 3/2) silty clay loam; brown (10YR 4/3) ped interiors; moderate, fine, subangular blocky structure; continuous clay films; firm; abundant, small roots; slightly acid; gradual, smooth boundary. 4 to 12 inches thick.
- B₂—14 to 24 inches, dark yellowish-brown (10YR 3/4) silty clay loam; common, fine, faint mottles of dark grayish brown (2.5Y 4/2); weak, fine, subangular blocky structure; common, discontinuous clay films; firm; slightly acid; gradual, smooth boundary. 6 to 12 inches thick.
- B₃—24 to 36 inches, brown (10YR 4/3) silt loam; common, fine, faint mottles of dark grayish brown (2.5Y 4/2); weak, fine, subangular blocky structure; very friable; medium acid; clear, smooth boundary. 6 to 14 inches thick.
- D₁—36 to 48 inches +, brown (10YR 4/3) very fine sandy loam; massive; very friable; medium acid.

Range in characteristics: The B₂ horizon ranges from silty clay loam to silty clay. The B₃ horizon is absent in some places. The

B₂ horizon ranges from dark brown and dark yellowish brown to dark grayish brown. The B₁ horizon ranges from silt loam to loam and is absent from some profiles, in which case the B₃ horizon abruptly overlies the D₁ horizon. The D₁ horizon ranges from brown (10YR 4/3) to brown (10YR 5/3) and dark grayish brown (10YR 4/2) and is mottled in places. Some profiles have a D₁ horizon of loamy fine sand or fine sandy loam. Depth to the D₁ horizon ranges from 24 to 40 inches.

Both the Dundee and Dubbs soils have a thicker and darker horizon (A₁ or Ap) of organic-mineral material, and less evidence of a leached horizon (A₂) than is normal for Gray-Brown Podzolic soils. In some profiles it is evident that the organic matter has moved from the A horizon to the upper part of the B horizon. The Dubbs and Dundee soils have several characteristics of Prairie soils and can be considered as intergrades. Laboratory data show base saturation to be nearly 70 percent in all horizons in both the Dundee and Dobbs soils.

Bosket soils are in the Gray-Brown Podzolic great soil group. They have weak profile development. These soils developed in stratified, old alluvium on old natural levees that border former channels of the Mississippi River. They are well drained and have a thinner solum than the Dubbs or Dundee soils. Bosket soils are underlain by sandy material at a depth of 18 to 27 inches. These soils have a dark, organic-mineral horizon (Ap). No evidence of a leached horizon was found. The illuviated horizon is rather thin, but clay films on ped surfaces show the downward movement of clay. The Bosket soils have characteristics of Prairie soils and can be considered as intergrades.

Bosket series.—The following is a representative profile of Bosket silt loam in a moist, cultivated area.

- A_p—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; very friable; abundant, small roots; slightly acid; clear, smooth boundary. 5 to 9 inches thick.
- B₁—8 to 18 inches, very dark grayish-brown (10YR 3/2) to dark grayish-brown (10YR 4/2) silty clay loam; moderate, medium, subangular and angular blocky structure; common clay films; firm; abundant, small roots; common, small pores; slightly acid; clear, smooth boundary. 6 to 12 inches thick.
- B₂—18 to 24 inches, brown (10YR 4/3) loam; weak, fine and medium, subangular blocky structure; few, patchy clay films; friable; plentiful, small roots; medium acid; abrupt, smooth boundary. 4 to 8 inches thick.
- D₁—24 to 36 inches, brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) fine sandy loam; massive; very friable; medium acid; gradual, smooth boundary. 10 to 20 inches thick.
- D₂—36 to 48 inches +, brown (10YR 5/3) to yellowish-brown (10YR 5/4) loamy fine sand or fine sand; massive or single grain; very friable or loose; medium acid.

Range in characteristics: Some profiles have a black A₁ horizon 4 to 8 inches thick. The B₁ horizon ranges from brown (10YR 4/3) to dark grayish brown (10YR 4/2). The D₁ horizon ranges from brown (10YR 4/3) to brown (10YR 5/3); its texture ranges from very fine sandy loam to fine sand. The D₂ horizon ranges from brown (10YR 5/3) to yellowish brown (10YR 5/4) to pale brown (10YR 6/3); its texture ranges from fine sandy loam to sand. Depth to the D₁ horizon ranges from 18 to 27 inches.

Grenada and Loring soils are in the Gray-Brown Podzolic great soil group. They have a fragipan. These soils developed in thick loessal deposits on uplands; most areas have been cropped.

The Grenada soils are moderately well drained. Their slope range is 0 to 12 percent. The strongly developed horizon is at a depth of about 2 feet. In virgin areas the

Grenada soils have a thin organic layer, a thin dark organic-mineral layer, and a leached layer, all in the A horizon. For the most part, these layers have been intermixed by cultivation to form an Ap horizon. The B horizon has about 10 percent more clay than the A horizon, and has a few clay films, which indicates that the clay has moved down from the A horizon. The greatest clay accumulation, however, is in the fragipan (B3m2). The upper part of the fragipan (B3m1) shows a loss of clay. Therefore, Grenada soils have some properties of a bisequum profile. The fragipan is very firm, brittle, and compact. In this respect, Grenada soils are like Planosols.

Laboratory data show that base saturation is low but increases with depth.

Grenada series.—The following is a representative profile of Grenada silt loam, 2 to 6 percent slopes, in a moist, cultivated area.

A_p—0 to 8 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; abundant, small roots; strongly acid; abrupt, smooth boundary. 6 to 9 inches thick.

B₁—8 to 17 inches, yellowish-brown (10 YR 5/4) silt loam; weak, fine, subangular blocky structure; few, faint clay films; friable; few, small, black concretions; very strongly acid; clear, smooth boundary. 6 to 14 inches thick.

B₂—17 to 24 inches, yellowish-brown (10YR 5/4) silt loam; many, medium, faint mottles of pale brown (10 YR 6/3); moderate, fine, subangular blocky structure; common silt coatings of pale brown (10YR 6/3); friable to firm; common, small, black concretions; very strongly acid; clear, wavy boundary. 4 to 10 inches thick.

B_{3m1}—24 to 29 inches, mottled light brownish-gray (10YR 6/2), pale-brown (10YR 6/3), and yellowish-brown (10YR 5/4) silt loam; mottles are fine and faint; moderate, fine and medium, subangular blocky structure; firm and slightly compact and brittle; many silt coatings of light brownish gray (10YR 6/2); common, small, black or very dark brown concretions; very strongly acid; clear, wavy boundary. 3 to 8 inches thick.

B_{3m2}—29 to 45 inches, light brownish-gray (2.5Y 6/2) silty clay loam; common, medium, distinct mottles of strong brown (7.5YR 5/6) and dark yellowish brown (10YR 4/4); moderate, medium and coarse, angular blocky structure; many, light brownish-gray (10YR 6/2) silt coatings; very firm, brittle, and compact; common, small, black or very dark brown concretions; very strongly acid; gradual, wavy boundary. 14 to 20 inches thick.

C—45 to 60 inches, yellowish-brown (10YR 5/4) to dark yellowish-brown (10YR 4/4) and light brownish-gray (10YR 6/2) silt loam; mottles are coarse and distinct; massive; slightly compact in place, very friable when disturbed; very strongly acid.

Range in characteristics: The A_p horizon ranges from brown (10YR 4/3) to dark grayish brown (10YR 4/2); its structure ranges from weak, fine, granular to moderate, medium, granular. The B₁ horizon ranges from dark yellowish brown (10YR 4/4) to yellowish brown (10 YR 5/6); the B₂ horizon ranges from yellowish brown (10YR 5/6) to brown (10YR 5/3), and its mottles from pale brown (10YR 6/3) to light gray (10YR 7/2). In places the B_{3m1} horizon is dominantly grayish brown (2.5Y 5/2). This horizon is absent from some profiles. The B_{3m2} horizon ranges from silty clay loam to heavy silt loam. Some profiles have a B_{3m3} horizon of heavy silt loam, 4 to 10 inches thick, evenly mottled, and of the same colors as the B_{3m2} horizon. The C horizon, in places, is dominantly dark yellowish brown (10YR 4/4). The depth to the fragipan ranges from 20 to 28 inches. The C horizon is from 15 to 50 feet thick and, in places, is calcareous below a depth of 20 feet. Small, black concretions are often present throughout the profile.

Loring soils are well drained to moderately well drained. Their slope range is 0 to 20 percent. They have a weak fragipan at a depth of about 32 inches. The surface horizon of Loring soils is typical for the Gray-Brown Podzolic group if the profile is virgin. The B horizon has the highest content of clay; the downward translocation of clay is shown by clay films in this horizon. The fragipan is only slightly brittle and compact. There is no evidence of a bisequum profile as there is in Grenada soils. Base saturation is near 50 percent throughout the B and C horizons (see table 9 on page 54).

Loring series.—The following is a representative profile of Loring silt loam, 2 to 6 percent slopes, in a moist, cultivated area.

A_p—0 to 8 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; abundant, small roots; strongly acid; abrupt, smooth boundary. 6 to 10 inches thick.

B₁—8 to 12 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, subangular blocky structure; friable; abundant, small roots; very strongly acid; clear, smooth boundary. 2 to 8 inches thick.

B₂—12 to 24 inches, brown (7.5YR 4/4) silty clay loam; moderate, fine and medium, angular blocky structure; common, thin clay films; few silt coatings; firm; plentiful, small roots; very strongly acid; gradual, smooth boundary. 8 to 15 inches thick.

B₃—24 to 32 inches, brown (7.5YR 4/4) to yellowish-brown (10YR 5/4) heavy silt loam; common, fine, faint mottles and silt coatings of pale brown (10YR 6/3); moderate, medium, angular blocky structure; firm to friable; few, small, black concretions; very strongly acid; gradual, wavy boundary. 6 to 15 inches thick.

B_{3m}—32 to 48 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; many, medium, faint mottles and silt coatings of brown (10YR 5/3) and light brownish gray (10YR 6/2); moderate, medium and coarse, subangular blocky structure; friable to firm and slightly compact and brittle; few, small, black concretions; very strongly acid; diffuse, wavy boundary. 10 to 20 inches thick.

C—48 to 60 inches, dark yellowish-brown (10YR 4/4) silt loam; common, medium, distinct mottles of light brownish gray (2.5Y 6/2) to light brownish gray (10YR 6/2); massive; friable; very strongly acid; 10 or more feet thick.

Range in characteristics: The A_p horizon ranges from brown (10YR 4/3) to dark grayish brown (10YR 4/2); its structure ranges from weak, fine, granular to moderate, medium, granular. The B₁ horizon ranges from dark yellowish brown (10YR 4/4) to yellowish brown (10 YR 5/6). In some profiles there is no B₁ horizon. The B₂ horizon ranges from silty clay loam to heavy silt loam, and from firm to friable. The B₃ horizon ranges from heavy silt loam to light silty clay loam. Depth to the fragipan ranges from 28 to 36 inches; depth to the C horizon ranges from 40 to 55 inches. The C horizon, in places, is calcareous below a depth of 20 feet.

Intrazonal soils

The intrazonal order is made up of soils having more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief or parent material over the normal influence of climate and living matter. In Fulton County the intrazonal order is represented by the Planosol, Humic Gley, Low-Humic Gley, and Grumusol great soil groups. Intrazonal soils occupy about 30 percent of the county.

PLANOSOLS

In this great soil group are intrazonal soils that developed under poor to somewhat poor drainage in flat or depressed areas. These soils have a thin surface hori-

zon over a subsoil that is underlain by a very firm, brittle, compact fragipan. The Calloway and Henry soils are in this great soil group; together they occupy about 8 percent of the county.

Calloway soils are somewhat poorly drained and developed in thick loessal deposits on uplands and stream terraces. Their slope range is 0 to 6 percent. Most areas have been cleared and cropped. In virgin areas, the A horizon consists of a thin organic layer covering a thin, dark, organic-mineral layer that overlies a leached layer. The B horizon above the fragipan shows only a small amount of clay accumulation, and the same is true of the upper layer of the fragipan (B_{3m1}) (see table 8 on page 50). The middle and lower layers of the fragipan (B_{3m2} and B_{3m3}) show the greatest amount of clay accumulation. Because of the uniform texture of the underlying loessal deposits, there is little doubt that the higher clay content of horizons B_{3m2} and B_{3m3} is the result of downward translocation of clay. Some clay films are present on the larger peds.

The Calloway soils that developed on uplands are strongly acid throughout and have low base saturation that increases with depth but does not reach 35 percent within the solum. The Calloway soils on terraces differ in that they have higher base saturation that increases with depth and reaches more than 50 percent in the fragipan. It is reasonable to assume that the Calloway soils on terraces are younger, and that leaching has not been so severe as on the uplands.

Calloway series.—The following is a representative profile of Calloway silt loam, 0 to 2 percent slopes, in a moist, cultivated area.

A_r—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; few, fine, faint mottles of light brownish gray; moderate, medium, granular structure; very friable; common, small, black concretions; abundant, small roots; strongly acid; abrupt, smooth boundary. 6 to 10 inches thick.

B_{2r}—7 to 12 inches, yellowish-brown (10YR 5/4) silt loam; many, medium, faint mottles of light brownish gray (10YR 6/2); weak, fine, blocky structure; friable; common, small, black concretions; very strongly acid; clear, smooth boundary. 4 to 10 inches thick.

B_{2er}—12 to 17 inches, light brownish-gray (2.5Y 6/2) and yellowish-brown (10YR 5/4) silt loam; mottles are medium and faint; weak, fine, subangular blocky structure; friable; many, medium, dark-brown and black concretions; very strongly acid; clear, wavy boundary. 4 to 8 inches thick.

B_{3m1}—17 to 21 inches, light brownish-gray (2.5Y 6/2) silt loam; many, fine, faint mottles of brown (10YR 5/3) and yellowish brown (10YR 5/6); moderate, medium, subangular blocky structure; firm and slightly compact and brittle; many, medium, soft, dark-brown and black concretions; very strongly acid; clear, smooth boundary. 2 to 6 inches thick.

B_{3ms}—21 to 31 inches, light brownish-gray (2.5Y 6/2) silt loam to silty clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/6); moderate, coarse, blocky structure; very firm; very compact and brittle; many, medium, soft, dark-brown and black concretions; very strongly acid; gradual, smooth boundary. 6 to 18 inches thick.

B_{3ms}—31 to 48 inches, mottled gray (10YR 6/1), dark yellowish-brown (10YR 4/4), and strong-brown (7.5YR 5/6) silt loam or silty clay loam; mottles are medium and distinct; moderate, coarse, blocky structure; firm and compact and brittle; many, small and large, soft, dark-brown concretions and stains; very strongly acid; gradual, smooth boundary. 10 to 20 inches thick.

C—48 to 60 inches +, mottled dark yellowish-brown (10 YR 4/4) to yellowish-brown (10YR 5/4) and light grayish-brown (10YR 6/2) silt loam; mottles are medium and faint; massive; friable; very strongly acid.

Range in characteristics: In the A_r horizon color ranges from dark grayish brown (10YR 4/2) to brown (10YR 4/3), and structure ranges from moderate, medium, granular to weak, fine, granular. The B_{2r} horizon ranges from yellowish brown (10YR 5/4) with mottles of light brownish gray (10YR 6/2) to evenly mottled colors like those of the B_{2er} horizon. The B_{2er} horizon is dominantly grayish brown in places. The structure of the B_{2r} and B_{2er} horizons ranges from weak to strong, fine to medium blocky. The grayish colors throughout the profile range in hue from 2.5Y to 10YR. B_{3m1} and B_{3ms} horizons range in structure from moderate, coarse, blocky to moderate, coarse, prismatic. These horizons have a few clay films and silt coatings in places. The depth to the C horizon ranges from 40 to 50 inches. The C material is dominantly brownish; its thickness ranges from 20 to 50 feet.

Henry soils are poorly drained. They developed in thick loess on uplands and stream terraces and occur in flat or depressed areas. Their slope range is 0 to 2 percent. Most areas remain wooded.

These soils have a thin organic cover over a thin organic-mineral layer. Below that is a leached A₂ layer. Comparing the clay content of the B_g horizon with that of the middle and lower layers of the fragipan indicates that the B_g horizon is also leached. Henry soils have weak structure, and in many profiles it is difficult to determine the structure. Generally, clay films, if present, are identifiable only on the faces of the larger peds. The B horizon has some relic properties. The upper layer of the fragipan also has properties of a leached horizon. The lower layers of the fragipan (B_{3m2} and B_{3m3}) are the illuvial horizons; their clay content, which is double that of the horizon above, indicates the downward translocation of clay. Base saturation is low in Henry soils that developed on uplands; it increases with depth but does not exceed 35 percent within the solum. It is reasonable to assume that in the Henry soils on terraces the base saturation is higher, as is the case with Calloway soils. Therefore, the Henry soils on terraces of this county would be younger and not so severely leached as Henry soils on uplands. Laboratory data from other States support this assumption.

Henry series.—The following is a representative profile of Henry silt loam in a moist area.

A_{0r}—1 to ½ inch, loose hardwood leaf litter that has not decomposed.

A_r—½ inch to 0, very dark grayish-brown (10YR 3/2) hardwood forest litter that is partially decomposed.

A_{2r}—0 to 1 inch, very dark gray (10YR 8/1), very dark grayish-brown (10YR 3/2), or dark grayish-brown (10YR 4/2) silt loam; common, fine, faint mottles of grayish brown (10YR 5/2) to gray (10YR 6/1); weak, fine, granular structure; very friable; abundant, small roots; medium to strongly acid; abrupt, smooth boundary. 1 to 2 inches thick.

A₂—1 to 5 inches, light brownish-gray (10YR 6/2) to brown (10YR 5/3) silt loam; many, fine, faint mottles of gray (10YR 6/1) and dark yellowish brown (10YR 4/4); weak, fine, granular structure; very friable; common, small, dark-brown and black concretions; very strongly acid; clear, smooth boundary. 3 to 6 inches thick.

B_r—5 to 14 inches, gray (10YR 6/1) silt loam; common, fine and medium, faint mottles of grayish brown (10YR 5/2) and yellowish brown (10YR 5/4); weak, fine, subangular and angular blocky structure; very friable; common, small, dark-brown and black concretions and stains; very strongly acid; clear, wavy boundary. 5 to 15 inches thick.

B_{sm1}—14 to 20 inches, gray (10YR 6/1) or light brownish-gray (2.5Y 6/2) silt loam; common, fine, faint mottles of yellowish brown (10YR 5/4) and grayish brown (2.5Y 5/2); weak, medium, subangular blocky structure; friable to firm, slightly compact and brittle; common, small, dark-brown and black concretions; very strongly acid; clear, smooth boundary. 3 to 8 inches thick.

B_{sm2}—20 to 30 inches, gray (10YR 6/1) to light brownish-gray (2.5Y 6/2) silt loam; common, fine, faint mottles of yellowish brown (10YR 5/6) or brown (10YR 4/3); moderate, medium and coarse, subangular blocky structure; firm, compact, and brittle; common, small, dark-brown and black concretions; very strongly acid; gradual, smooth boundary. 8 to 12 inches thick.

B_{sm3}—30 to 48 inches, gray (10YR 6/1) to light brownish-gray (2.5Y 6/2) silty clay loam; many, medium, distinct mottles of strong brown (7.5YR 5/6); moderate, medium and coarse, angular blocky structure; very firm and compact and brittle; common, dark-brown and black concretions and stains; very strongly acid; gradual, smooth boundary. 12 to 20 inches thick.

C—48 to 60 inches, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/4) and light grayish-brown (10YR 6/2) silt loam; mottles are medium and faint; massive; friable; very strongly acid. Several feet thick.

Range in characteristics: In cultivated areas an A_p horizon is present. It ranges from grayish brown to dark gray and has common to many, fine, faint mottles of gray and brown. The B_e horizon may be light brownish gray. The mottles of the B_{sm1}, B_{sm2}, and B_{sm3} horizons range from 2.5Y to 7.5YR in hue. Depth to the C horizon ranges from 42 to 52 inches. The C material may be dominantly brownish.

HUMIC GLEY SOILS

This great soil group consists of intrazonal soils that developed under very poor drainage. Because of an accumulation of considerable organic matter, these soils are characterized by a thick, black mineral A horizon and a gleyed subsoil. The Humic Gley soils occupy about 3 percent of the county.

Patton soils are representative of the Humic Gley group. They have the characteristic mineral A horizon that is thick and dark colored. In some profiles the upper half of the B horizon is also dark colored. Laboratory data (see table 8 on page 52) show that the B horizon has about 8 percent more clay than the A horizon, and that clay films are on most ped surfaces. Some clay flows were found in the underlying C horizon. For the most part, the B and C horizons are grayish brown or light olive brown and are mottled. Base saturation is high throughout the profile.

Patton series.—The following is a representative profile of Patton silt loam in a moist, cultivated area.

A_p—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine and medium, granular structure; very friable; few, small, dark-brown concretions; abundant, small roots; slightly acid; abrupt, smooth boundary. 6 to 10 inches thick.

A_{s1}—8 to 16 inches, black (10YR 2/1) silt loam; moderate, fine and medium, granular structure; friable; few, small, dark-brown concretions; clay content slightly higher than in A_p; abundant, small roots; neutral reaction; clear, smooth boundary. 6 to 12 inches thick.

B_{s1}—16 to 25 inches, very dark gray (10YR 3/1) to black (10YR 2/1) silty clay loam; few, fine, faint mottles of dark grayish brown (2.5Y 4/2); moderate, medium, prismatic structure breaking to moderate, medium, subangular and angular blocky structure; discontinuous clay films; firm; few, small, dark-brown concretions; abundant, small roots; neutral reaction; gradual, smooth boundary. 5 to 14 inches thick.

B_{s2}—25 to 32 inches, very dark gray (10YR 3/1) silty clay loam; common, fine, faint mottles of light olive brown (2.5Y 5/4) and dark grayish brown (2.5Y 5/2); moderate, medium, prismatic structure breaking to moderate, medium, blocky structure; discontinuous clay films; common, small, dark-brown concretions; plentiful, small roots; neutral reaction; gradual, smooth boundary. 6 to 15 inches thick.

C—32 to 60 inches, grayish-brown (2.5Y 5/2) and light olive-brown (2.5Y 5/4) or yellowish-brown (10YR 5/6) silt loam; mottles are many, fine, and faint; massive; friable; very dark gray material in old root channel; common, soft, black concretions and stains; neutral reaction.

Range in characteristics: The A_p horizon ranges from very dark grayish brown to very dark brown, and is moderate to weak in structure. In some profiles the A_{s1} and A_p horizons have few, fine, faint mottles of grayish brown. Depth to the B_e horizon ranges from 12 to 24 inches.

The B_e horizon ranges from very dark gray (10YR 3/1) or black (10YR 2/1) to grayish brown (2.5Y 5/2) with common, fine, faint mottles of olive yellow or light olive brown. The B_{s2} horizon ranges from silty clay loam to silty clay. Depth to the C horizon ranges from 24 to 48 inches. The C horizon, in places, is dominantly grayish brown (2.5Y 5/2) with few, fine, faint mottles. Horizon development in some profiles is weak. Reaction ranges from slightly acid to mildly alkaline.

LOW-HUMIC GLEY SOILS

This great soil group consists of intrazonal soils that are poorly drained. These soils have a very thin A horizon over a gleyed subsoil that is dominantly gray but has contrasting mottles. Generally, there is little difference between one horizon and another. This group of soils lacks the thick, dark surface layer of the Humic Gley soils and the fragipan or argipan of the Planosols. The Birds, Forestdale, and Waverly soils are representative of the Low-Humic Gley group and together occupy about 3 percent of the county.

Birds soils are poorly drained and formed in recent alluvium from alkaline or calcareous loess. They are frequently flooded, and their water table is high during most of the winter and spring. Virgin areas have a thin, moderately dark colored A horizon that overlies a gray subsoil that shows contrasting mottles. Birds soils have little to no profile development. Their surface horizon has weak to moderate, granular structure and low content of organic matter.

Birds series.—The following is a representative profile of Birds silt loam in a moist, cultivated area.

A_p—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; common, fine, faint mottles of dark brown (10YR 3/3); weak, fine, granular structure; very friable; abundant, small roots; slightly acid; abrupt, smooth boundary. 4 to 8 inches thick.

C_{s1}—7 to 16 inches, grayish-brown (2.5Y 5/2) silt loam; common, fine, faint mottles of brown (10YR 4/3); massive; very friable; plentiful, small roots; slightly acid; gradual, smooth boundary. 6 to 15 inches thick.

C_{s2}—16 to 48 inches, gray (10YR 5/1) silt loam; few, fine, faint mottles of brown (10YR 4/3); massive; very friable; slightly acid.

Range in characteristics: The A_p or A_{s1} horizon ranges from dark grayish brown to evenly mottled grayish brown and dark yellowish brown. The C_{s1} and C_{s2} horizons range from gray (10YR 6/1) to dark grayish brown (2.5Y 4/2), and the mottles in these layers range from yellowish brown to dark brown and olive brown. In some profiles small pores are common in the C horizon. Reaction ranges from slightly acid to alkaline. In some locations the C_{s1} horizon extends to a depth of from 18 to 30 inches and abruptly overlies Patton-like soil or poorly drained alluvium deposited by the Mississippi River. Small concretions and dark stains are common in some profiles.

Forestdale soils formed in old alluvium deposited by the Mississippi River on low-lying stream terraces. These soils are somewhat poorly drained to poorly drained. Most areas have been cleared. The solum is moderately fine textured to fine textured and, at a depth of from 40 to 50 inches, it is underlain by a coarser textured soil material. The surface horizon of Forestdale soils is thicker and darker than that of most Low-Humic Gley soils. In the gleyed B horizon, structure and a few clay films indicate slight profile development. The clay in these soils has some of the shrinking and swelling characteristics of the clay in the Grumusols.

Forestdale series.—The following is a representative profile of Forestdale silty clay loam in a moist, cultivated area.

- A_s—0 to 6 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, fine and medium, granular structure; firm to friable; abundant, small roots; slightly acid; clear, smooth boundary, 4 to 8 inches thick.
- B_{gr}—6 to 18 inches, grayish-brown (2.5Y 5/2) clay; common, medium, distinct mottles of brown (7.5YR 4/4) or dark yellowish brown (10YR 4/4); weak, fine, subangular blocky structure; thin, patchy clay films; very firm, plastic, and sticky; plentiful, small roots; medium acid; clear, smooth boundary. 6 to 16 inches thick.
- B_{gr}—18 to 30 inches, gray (10YR 5/1) clay; common, medium, distinct mottles of brown (7.5YR 4/4) or dark yellowish brown (10YR 4/4); weak, fine, blocky structure to massive; very firm, plastic, and sticky; medium acid; gradual, smooth boundary. 8 to 20 inches thick.
- B_{gr}—30 to 40 inches, gray (10YR 5/1) silty clay loam; many, medium, distinct mottles of brown (7.5YR 4/4) or dark yellowish brown (10YR 4/4); weak, medium, blocky structure; firm; medium acid; clear, smooth boundary. 6 to 12 inches thick.
- D—40 to 50 inches, gray (10YR 5/1) or light brownish-gray (10YR 6/2) silt loam or very fine sandy loam; many, medium, distinct mottles of strong brown (7.5YR 5/6) and dark yellowish brown (10YR 4/4); massive; very friable; medium acid.

Range in characteristics: Some profiles have a 4- to 8-inch B_s horizon of dark-brown and gray silty clay that shows medium and faint mottles. Other profiles have a 4- to 8-inch A_s horizon of very dark gray silty clay or clay. The B_{gr} horizon ranges from grayish brown to dark grayish brown; its structure ranges from weak, fine, subangular blocky to moderate, medium, blocky. The B_{gr} horizon ranges from gray to grayish brown. Some profiles lack the B_s horizon and overlie a bed of clay or silty clay loam that extends to a depth of 48 inches or deeper. In some profiles the B_{gr} horizon abruptly overlies the D horizon. The reaction ranges from strongly acid to neutral.

Waverly soils are similar to Birds soils. Waverly soils, however, are strongly acid. They formed in recent acid alluvium of loessal origin. There is little or no difference in texture and structure throughout the profile. The solum consists of a thin, grayish-brown A horizon that overlies a gleyed, very friable, silty subsoil. In the solum there is no evidence of structural or textural development. Waverly soils are often flooded, and their water table is at or near the surface during wet seasons.

Waverly series.—The following is a representative profile of Waverly silt loam in a moist area.

- A—0 to 3 inches, grayish-brown (2.5Y 5/2) silt loam; common, fine and medium, distinct mottles of yellowish red (5YR 4/6) and brown (10YR 4/3); weak, fine, granular structure; very friable; abundant, small roots; medium acid; clear, smooth boundary. 1 to 6 inches thick.
- C_{gr}—3 to 15 inches, gray (10YR 6/1) silt loam; common, medium, distinct mottles of brown (7.5YR 4/4) and

10YR 4/3) and light yellowish brown (2.5Y 6/4); massive; very friable; common, very dark brown and black concretions and soft concretionary material; strongly acid; gradual, smooth boundary. 5 to 15 inches thick.

- C_{gr}—15 to 48 inches, gray (10YR 6/1) silt loam; common, medium and coarse, faint mottles of dark brown (10YR 3/3); massive; very friable to friable; common, very dark brown and black concretions and concretionary material; strongly acid.

Range in characteristics: The A_s horizon ranges from grayish brown to dark grayish brown and, in some profiles, is evenly mottled dark brown and yellowish red. The C_{gr} horizon ranges from gray (10YR 6/1) to grayish-brown (2.5Y 5/2). The C_{gr} horizon ranges from gray (10YR 6/1) to gray (N 5/0) and gray (5Y 5/1). In places the C_{gr} horizon, at a depth of about 40 inches, overlies a firm layer of silty clay loam that is the same color as the C_{gr} horizon.

GRUMUSOLS

The soils in this great soil group developed in clay and are relatively uniform in texture. Because these soils swell and shrink as they wet and dry, the soil material is mixed and churned.

Sharkey and Tunica soils are in the Grumusols group but they have some properties of Alluvial soils. The Sharkey and Tunica soils developed in fine-textured alluvium deposited by the Mississippi River in the slack-water areas. The Sharkey soils are poorly drained; they formed in 3 feet or more of clayey alluvium that was underlain by coarser textured alluvium. The Tunica soils are somewhat poorly drained; they are underlain by coarser textured alluvium at a depth of from 2 to 3 feet. The Grumusols occupy 14 percent of the county.

The Sharkey soils have a dark surface layer and moderate to strong, granular structure, which has some self-mulching properties when the soils are dry. Cracks up to 1 inch wide and 2½ feet deep are common when the soils are dry. Slickensides are present, but they are not abundant. In some profiles the dark surface layer extends to a depth of about 2 feet. In other places, only 6 inches of the surface soil is dark. The cation exchange capacity is nearly 30 milliequivalents per 100 grams of soil, and base saturation is high (see table 8 on page 52).

Sharkey series.—The following is a representative profile of a Sharkey soil in a moist, cultivated area.

- A_{1pr}—0 to 4 inches, very dark grayish-brown (10YR 3/2) light silty clay; moderate to strong, medium, granular structure; firm and sticky and plastic; abundant roots; neutral reaction; clear, smooth boundary. 3 to 6 inches thick.

- A_{1pr}—4 to 8 inches, very dark gray (10YR 3/1) to very dark grayish-brown (10YR 3/2) clay; dark-brown concretions; weak, fine, angular blocky structure; very firm and compact (traffic pan); abundant roots; neutral reaction; abrupt, smooth boundary. 3 to 6 inches thick.

- C_{gr}—8 to 18 inches, very dark gray (10YR 3/1) to dark gray (10YR 4/1) clay; common, fine, distinct mottles of brown (7.5YR 4/4); weak, fine, blocky structure; very firm and sticky and plastic; plentiful, small roots; neutral reaction; gradual, smooth boundary. 4 to 12 inches thick.

- C_{gr}—18 to 31 inches, very dark gray (10YR 3/1) to dark gray (10YR 4/1) clay; common, fine, distinct mottles of brown (7.5YR 4/4); weak, coarse, subangular blocky structure to massive; very firm, very sticky, and very plastic; slight evidence of some pressure faces; few, small, black, round concretions; plentiful, small roots; neutral reaction; diffuse, smooth boundary. 10 to 20 inches thick.

- C_{ss} —31 to 49 inches, dark-gray (N 4/0) clay; common, fine, distinct, dark-brown mottles; massive; very firm, very sticky, and very plastic; few, small roots; mildly alkaline; clear, wavy boundary. 10 to 30 inches thick.
- C_{ss} —49 to 69 inches, gray (N 5/0) to dark-gray (N 4/0) clay; common, fine, distinct, dark-brown mottles; massive; very firm, very sticky, and very plastic; few to no roots; mildly alkaline.

Range in characteristics: The A_{top} horizon ranges from light silty clay to clay, and this horizon is absent from some profiles. The C_{ss} horizon also is sometimes absent, in which case the C_{st} horizon overlies the C_{ss} horizon. The C_{ss} and C_{st} horizons range from gray (N 5/0) and dark gray (N 4/0) to grayish brown (2.5Y 5/2). The C_{ss} horizon, in places, extends to a depth of from 40 to 60 inches and overlies coarser textured material. In some profiles the mottles are more red.

The Tunica soils have a dark surface layer that has some self-mulching properties and that extends to a depth of 2 feet in some profiles. In examining profiles for this report, fewer slickensides were identified in Tunica soils than in Sharkey soils. The Tunica soils, however, were examined in less detail. Cracks in the Tunica soils were not so abundant, nor so wide as in the Sharkey soils.

Tunica series.—The following is a representative profile of Tunica clay in a moist, cultivated area.

- A_p —0 to 8 inches, very dark grayish-brown (10YR 3/2) silty clay to clay; moderate, medium, granular structure; firm, sticky, and plastic; abundant, small roots; neutral reaction; clear, smooth boundary. 5 to 9 inches thick.
- C_{st} —8 to 24 inches, dark grayish-brown (10YR 4/2) to very dark grayish-brown (10YR 3/2) clay; common, medium, faint mottles of dark yellowish brown (10YR 4/4); weak, fine, blocky structure to massive; very firm, sticky, and plastic; abundant to plentiful, small roots; neutral reaction; gradual, smooth boundary. 12 to 24 inches thick.
- C_{ss} —24 to 32 inches, dark yellowish-brown (10YR 4/4), dark grayish-brown (10YR 4/2), and gray (10YR 5/1) silty clay loam; mottles are medium and faint; massive; firm; few, small roots; neutral reaction; clear, smooth boundary. 4 to 14 inches thick.
- D—32 to 48 inches, grayish-brown (2.5Y 5/2) to dark grayish-brown (10YR 4/2) and dark yellowish-brown (10YR 4/4) silt loam or fine sandy loam; mottles are medium and faint; massive; very friable; neutral reaction.

Range in characteristics: In some profiles the lower half of the A_p horizon shows evidence of a traffic pan. The C_{ss} horizon, in places, is evenly mottled dark brown and gray. The C_{st} horizon is sometimes absent, in which case the C_{ss} horizon abruptly overlies the D horizon. The D horizon in places consists of stratified layers of fine sandy loam, silt loam, and silty clay loam, or of fine sandy loam and silty clay loam.

Azonal soils

The azonal order consists of soils that do not have distinct, genetically related horizons because of their youth, resistant parent material, or excessive relief. There is only one great soil group, the Alluvial soils, of this order in Fulton County. The Alluvial soils occupy approximately 30 percent of the county.

ALLUVIAL SOILS

This great soil group is made up of soils that formed from alluvium that was transported and deposited recently and that has been modified little by the soil-forming processes. These soils are well drained to somewhat poorly drained. Eight soil series in the Alluvial great soil group are in the county. These Alluvial soils occupy about 28 percent of the county.

Adler and Wakeland soils formed in alluvium that washed from alkaline or calcareous loess. The Adler soils

are moderately well drained. Their surface soil is of weak, granular structure, and they are mottled with gray at a depth of 20 to 28 inches. The Wakeland soils are somewhat poorly drained. They are mottled and, at a depth of about 15 inches, are gleyed. In this respect they intergrade to the Low-Humic Gley great soil group. The surface soil of the Wakeland soils has weak, granular structure.

Adler series.—The following is a representative profile of Adler silt loam in a moist, cultivated area.

- A_p —0 to 8 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; abundant, small roots; slightly acid to mildly alkaline; clear, smooth boundary. 6 to 9 inches thick.
- C_t —8 to 20 inches, brown (10YR 4/3) silt loam; few, fine, faint mottles of light brownish gray (10YR 6/2); weak fine, granular structure; very friable; slightly acid to mildly alkaline; gradual, smooth boundary. 8 to 18 inches thick.
- C_{st} —20 to 30 inches, brown (10YR 4/3) and grayish-brown (2.5Y 5/2) silt loam; mottles are fine and distinct; massive; very friable; slightly acid to mildly alkaline; gradual, smooth boundary. 6 to 20 inches thick.
- C_{ss} —30 to 48 inches, gray (10YR 5/1) silt loam; common, fine, distinct mottles of dark brown (10YR 3/3); massive; friable; mildly alkaline.

Range in characteristics: The A_p and C_t horizons range from brown (10YR 4/3) to dark grayish brown (10YR 4/2), brown (10YR 5/3), and dark brown (10YR 3/3). In places these horizons are highly stratified. The C_{ss} and C_{st} horizons range from dark gray (10YR 4/1) to grayish brown (2.5Y 5/2), and, in places, these layers contain small dark-brown or black concretions. The C_t or C_{ss} horizon, in places, abruptly overlies poorly drained alluvium from the Mississippi River or Patton-like soil material.

Wakeland series.—The following is a representative profile of Wakeland silt loam in a moist, cultivated area.

- A_p —0 to 8 inches, brown (10YR 4/3) to dark grayish-brown (10YR 4/2) silt loam; few, fine, distinct mottles of light brownish gray (2.5Y 6/2); weak, fine, granular structure; very friable; abundant, small roots; neutral reaction; clear, smooth boundary. 5 to 9 inches thick.
- C_t —8 to 15 inches, brown (10YR 5/3) or dark grayish-brown (10YR 5/2) silt loam; many, fine and medium, distinct mottles of light brownish gray (2.5Y 6/2); weak, fine, granular structure; very friable; few, small, dark-brown and black concretions; plentiful, small roots; mildly alkaline; clear, smooth boundary. 5 to 10 inches thick.
- C_{ss} —15 to 48 inches, light brownish-gray (2.5Y 6/2) to grayish-brown (2.5Y 5/2) silt loam; common, medium, distinct mottles of dark yellowish brown (10YR 4/4); massive; very friable; common, soft, dark-brown and black concretions; mildly alkaline.

Range in characteristics: The A_p horizon ranges from brown (10YR 4/3) to dark grayish brown (10YR 4/2) to brown (10YR 5/3) and dark yellowish brown (10YR 4/4). Its structure ranges from weak, fine, granular to moderate, medium, granular. The C_t horizon ranges from brown or dark grayish brown to evenly mottled grayish brown and brown. In some profiles this horizon is structureless (massive). At a depth of about 30 inches, some profiles have a gray or dark-gray C_{ss} horizon with medium and faint mottles of light gray and brown and with other characteristics of the C_{ss} horizon. The C horizon ranges from mildly alkaline to moderately alkaline. The mottles of the C_{ss} horizon range from dark yellowish brown (10YR 4/4) to yellowish brown (10YR 5/6). The C_t or C_{ss} horizons, in places, abruptly overlie poorly drained alluvium from the Mississippi River or Patton-like soil material.

Collins and Falaya soils formed in acid alluvium that washed from loess. Except for being more acid, the Collins and Falaya soils are similar to the Adler and Wakeland soils. The Collins soils are moderately well drained. Their surface soil is of weak, granular structure

and they are mottled at a depth below 20 inches. The Falaya soils are somewhat poorly drained. Their surface soil is also of weak, granular structure. They are gleyed at a depth below 15 inches, and like the Wakeland soils, they intergrade to the Low-Humic Gley great soil group.

Collins series.—The following is a representative profile of Collins silt loam in a moist, cultivated area.

- A_p—0 to 8 inches, brown (10YR 4/3) silt loam; weak, fine and medium, granular structure; very friable; abundant, small roots; strongly acid; clear, smooth boundary. 5 to 9 inches thick.
- C₁—8 to 20 inches, brown (10YR 4/3) silt loam; few, fine, faint mottles of light brownish gray (10YR 6/2) and brown (7.5YR 4/4); weak, fine, granular structure to massive in lower part; very friable; plentiful, small roots; strongly acid; gradual, smooth boundary. 8 to 14 inches thick.
- C_{2a}—20 to 30 inches, brown (10YR 4/3) and light brownish-gray (10YR 6/2) silt loam; mottles are medium and faint; massive; very friable; few, dark-brown concretions; strongly acid; clear, smooth boundary. 6 to 20 inches thick.
- C_{2b}—30 to 48 inches, grayish-brown (2.5Y 5/2) to light brownish-gray (2.5Y 6/2) silt loam; common, medium, distinct mottles of brown (7.5YR 4/4) and gray (10YR 6/1); massive; very friable; common, soft, dark-brown and black concretions and stains; strongly acid.

Range in characteristics: The A_p and C₁ horizons range from brown (10YR 4/3) to yellowish brown (10YR 5/4). In some profiles the dominant color of the C_{2a} horizon ranges from brown to pale brown. Mottles in the C_{2a} horizon range from 5YR to 10YR. In some profiles the C_{2a} horizon extends to a depth greater than 48 inches. All horizons range from medium acid to very strongly acid.

Falaya series.—The following is a representative profile of Falaya silt loam in a moist, cultivated area.

- A_p—0 to 7 inches, brown (10YR 4/3) silt loam; few, fine, faint mottles of light brownish gray (10YR 6/2); weak, fine, granular structure; very friable; abundant, small roots; strongly acid; clear, smooth boundary. 5 to 9 inches thick.
- C₁—7 to 15 inches, brown (10YR 4/3) silt loam; many, medium, faint mottles of light brownish gray (10YR 6/2); weak, fine, granular structure; very friable; strongly acid; clear, smooth boundary. 5 to 10 inches thick.
- C_{2a}—15 to 25 inches, grayish-brown (2.5Y 5/2) silt loam; common, medium, faint mottles of brown (10YR 4/3); massive; very friable; common, soft, dark-brown and black concretions and stains; strongly acid; gradual, smooth boundary. 8 to 20 inches thick.
- C_{2b}—25 to 48 inches, gray (10YR 5/1) silt loam; common, medium, distinct mottles of yellowish brown (10YR 5/4); massive; friable to very friable; common, soft, dark-brown and black concretions and stains; very strongly acid.

Range in characteristics: The A_p and C₁ horizons range from brown (10YR 4/3) to dark grayish brown (10YR 4/2) and brown (10YR 5/3). Their structure ranges from weak, fine, granular to moderate, medium, granular. In some profiles the C₁ horizon is evenly mottled brown and gray and extends to a depth of 20 inches. Some profiles are minus the C_{2a} horizon. Reaction ranges from medium acid to strongly acid.

Beulah soils formed in alluvium deposited by the Mississippi River. These soils are somewhat excessively drained. They occur on old natural levees that border former channels of the river. Unlike most Alluvial soils, Beulah soils have some profile development. Their surface horizon is dark and is of weak, granular structure. Development in the subsoil is in the form of lamellae, or bands of finer textured material that are a fraction of an

inch to 3 inches thick. These lamellae, or their layers, have some weak clay films and show increases of organic carbon and free iron (see table 8 on page 50). Beulah soils formed in stratified materials, and discontinuities in parent material do not necessarily coincide with the presence of the lamellae.

Beulah series.—The following is a representative profile of a Beulah soil in a moist, cultivated area.

- A_p—0 to 9 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; very friable; abundant, small roots; slightly acid; abrupt, wavy boundary. 4 to 11 inches thick.
- B₁—9 to 18 inches, brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; very friable; common, small pockets and fingers of A_p material; plentiful, small roots; slightly acid; clear, smooth boundary. 5 to 10 inches thick.
- B₂—18 to 30 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; weak, fine, granular structure; few, weak clay films; somewhat compact in place, very friable when disturbed; common, small pores; plentiful, small roots; slightly acid; abrupt, smooth boundary; 3 to 12 inches thick.
- C₁—30 to 50 inches, dark yellowish-brown (10YR 4/4) loamy fine sand; massive; single grain (structureless) when crushed; very friable to loose; common, small pores; medium acid; clear, smooth boundary.
- C₂—50 to 70 inches, pale-brown (10YR 6/3) fine sand; massive, single grain (structureless) when crushed; loose; medium acid.

Range in characteristics: The A_p horizon ranges from very dark grayish brown (10YR 3/2) to dark brown (10YR 3/3). In some profiles there is a traffic pan in the lower part of the A_p horizon. The B₁ horizon ranges from brown (10YR 4/3) to dark grayish-brown (10YR 4/2). In places there is a B₂ horizon if the B₁ horizon is thin. The B₂ horizon ranges from fine sandy loam to loamy fine sand and contains bands of fine sandy loam or loam that are 2 to 3 inches wide. The B₂ horizon ranges from dark yellowish brown (10YR 4/4) to brown (10YR 5/3). The C₁ horizon ranges from dark yellowish brown (10YR 4/4) to brown (10YR 5/3), and from loamy fine sand to fine sand. The C₂ horizon ranges from pale brown (10YR 6/3) to light gray (10YR 7/2), and from fine sand to sand. The depth to the C horizon ranges from 16 to 34 inches. Some profiles are minus either the C₁ horizon or the C₂ horizon, in which case the horizon that is present extends the full depth of the two horizons.

Commerce and Robinsonville soils formed in alluvium deposited by the Mississippi River. These soils are on natural levees, or bottom lands, near the river. The Commerce soils are moderately well drained to somewhat poorly drained. Two types of Commerce soils are in the county, Commerce silt loam and Commerce silty clay loam. Their surface soil is dark and has medium to weak, granular structure. Gleyed horizons are at a depth of from 14 to 24 inches.

Robinsonville soils are well drained to moderately well drained. In these soils, stratification is more evident than in Commerce soils. Fine sandy loam, silt loam, and silty clay loam types are mapped in the county. Their surface soil is dark and is of medium or weak, granular structure. The silty types are underlain by a coarser textured material at a depth of about 2 feet.

Commerce series.—The following is a representative profile of Commerce silt loam in a moist, cultivated area.

- A_p—0 to 6 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine and medium, granular structure; very friable; abundant, small roots; neutral reaction; clear, smooth boundary. 4 to 8 inches thick.
- C₁—6 to 14 inches, dark grayish-brown (10YR 4/2) to very dark grayish-brown (10YR 3/2) silt loam; few, fine, faint mottles of grayish brown (2.5Y 5/2); weak, fine,

- and medium, granular structure; very friable; abundant, small roots; mildly alkaline; gradual, smooth boundary. 6 to 12 inches thick.
- C_{gr}-14 to 24 inches, grayish-brown (2.5Y 5/2) silt loam; many, fine faint mottles of dark brown (10YR 3/3); massive; very friable; few, small roots; mildly alkaline; gradual, wavy boundary. 6 to 12 inches thick.
- C_{gr}-24 to 40 inches, grayish-brown (2.5 Y 5/2) silt loam with faint, medium mottles of dark gray (10YR 4/1) and few, distinct mottles of dark brown (10YR 3/3); massive; friable; mildly alkaline; clear, smooth boundary. 10 to 30 inches thick.
- C_{gr}-40 to 48 inches; dark-gray (10YR 4/1) to gray (5Y 5/1) silty clay loam; common, fine, faint mottles of grayish brown (2.5Y 5/2); massive; firm; mildly alkaline.

Range in characteristics: The A_o horizon ranges from very dark grayish brown (10YR 3/2) to dark grayish brown (10YR 4/2) and dark brown (10YR 3/3). Small areas of a soil with a loam surface layer were included in mapping Commerce silt loam. The C₁ horizon ranges in hue from 10YR to 2.5Y. The C₂ and C₃ horizons, in places, are highly stratified layers of silty clay loam, fine sandy loam, and silt loam, and some of the layers of silty clay loam are very dark gray. Some profiles are minus the C₂ and C₃ horizons, in which case the C₁ horizon overlies a thick silty clay loam horizon like the C₄. In locations close to the river the C₄ horizon is absent from some profiles and the C₃ horizon overlies a very fine sandy loam of about the same colors as the C₄.

Robinsonville series.—The following is a representative profile of Robinsonville silt loam in a moist, cultivated area.

- A_p-0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine and medium, granular structure; very friable; abundant, small roots; mildly alkaline; clear, smooth boundary. 6 to 9 inches thick.
- C₁-8 to 24 inches, dark grayish-brown (10YR 4/2) or very dark grayish brown (10YR 3/2) silt loam; weak, fine, granular structure ranging to massive in lower half; very friable; abundant, small roots; mildly alkaline; smooth, abrupt boundary. 10 to 28 inches thick.
- D-24 to 48 inches +, brown (10YR 5/3) or dark grayish-brown (10YR 4/2) fine sandy loam; massive; very friable; mildly alkaline.

Range in characteristics: The A_o horizon ranges from very dark grayish brown (10YR 3/2) to dark brown (10YR 3/3) or dark grayish brown (10YR 4/2). The D horizon, in places, consists of stratified layers of fine sandy loam, silt loam, and silty clay loam. The D horizon is replaced in some profiles by a C₂ horizon of dark grayish-brown silt loam or silty clay loam with a few, fine, faint mottles of gray and brown.

Crevasse soils formed in alluvium deposited by the Mississippi River. These are excessively drained soils on sandy natural levees near the river. Their surface soil, slightly darker than the underlying sandy material, has weak, granular structure or is structureless (single grain). Crevasse soils are stratified and, in places, have alternating layers of sand and silt below a depth of 2 feet.

Crevasse series.—The following is a representative profile of a Crevasse soil in a moist area.

- A₁-0 to 6 inches, dark grayish-brown (10YR 4/2) loamy fine sand; weak, fine, granular structure to single grain; very friable to loose; abundant, small roots; slightly acid; clear, smooth boundary. 4 to 10 inches thick.
- C₁-6 to 25 inches, grayish-brown (10YR 5/2) fine sand; single grain (structureless); loose; plentiful, small roots; slightly acid; clear, smooth boundary. 10 to 25 inches thick.
- C₂-25 to 50 inches, light brownish-gray (10YR 6/2) to dark grayish-brown (10YR 4/2) loamy fine sand; massive or single grain (structureless); very friable to loose; common, thin layers of very fine sandy loam or silt loam; neutral reaction.

Range in characteristics: The A₁ or A_o horizon ranges from grayish brown (10YR 5/2) to dark brown (10YR 3/3). The C₁ horizon ranges from grayish brown (10YR 5/2) to brown (10YR

5/3). The C₁ and C₂ horizons range from loamy fine sand to fine sand or sand. In some profiles the C₂ horizon is underlain, at a depth of 36 to 42 inches, by either a dark grayish-brown silt loam that has a few, fine, faint mottles of dark brown or strong brown, or by alternating layers of sand and silt loam.

Additional Facts About the County

This section was written mainly for those not familiar with the county. It discusses early settlement and population, geology, natural resources, agriculture and other industries, and climate.

Settlement and Population

What is now Fulton County was part of the Jackson Purchase of 1818 from the Chickasaw Indians. The county was formed from the southwestern part of Hickman County in 1845. It was the 99th county formed in Kentucky and was named in honor of Robert Fulton, the great inventor. Hickman is the county seat. In 1819 this city was the site of the first permanent settlement within the area that later became Fulton County. Hickman was then known as Mills Point. The city of Fulton, the main junction of the north-south line of the Illinois Central Railroad, was settled in 1860.

The population of Fulton County was 7,977 in 1880; 15,413 in 1940; 13,668 in 1950; and 11,256 in 1960. According to the Federal census, the rural population was 10,444 in 1950. Of this, 4,415 was farm and 6,029 was nonfarm. The rural population had decreased to 7,991 in 1960; 2,678 farm, and 5,313 nonfarm.

Geology

Fulton County is in the northernmost part of the Mississippi embayment. It is in this part of Kentucky that the youngest strata in the State are exposed.

The youngest sediments, composed of alluvium, are on the flood plains of the Mississippi River, Bayou du Chien, and tributary streams. About half of the county is covered with these deposits.

All the uplands are covered with loessal deposits. The loess is 40 to 70 feet thick at the bluffs, and about 10 feet thick at the eastern edge of the county. The chief mineral contained in the loess is quartz; minor minerals are mica, feldspar, and hornblende.

The loessal deposits are underlain by Coastal-Plain gravel or sand. The gravel is 10 to 15 feet thick and confined largely to the northern part of the county. Gravel is absent in the southern part of the county but sand is present. The brown or yellow sand and gravel are coated with iron oxide and are underlain by the upper Eocene strata, which consist of gray clay and thin layers of gray or yellow sand (11).

The arrangement of strata in Fulton County is as follows:

Period:

	<i>Soil material</i>	<i>Thickness</i>
Quaternary:		
Recent	Alluvium.	
Pleistocene	Loess.....	10 to 70 ft.
Tertiary:		
Pliocene	Gravel or sand.....	10 to 15 ft.
Upper Eocene	Clay and sand.....	100 ft.
Middle Eocene	Sand and thin clay lenses.....	750 ft.

Natural Resources

Soil, water, and forests are the main natural resources in Fulton County. Soil resources, and forests to an extent, have been discussed in other sections of this report.

The Mississippi River is the western boundary of the county and is the largest source of water for irrigating or manufacturing. In towns and on farms, the water for home use comes from wells. Most livestock get their water from constructed ponds and lakes.

There are about 30,000 acres of forest in Fulton County. Large tracts of forest still remain in the lowlands, in areas not protected by levees. Oak, sweetgum, cottonwood, willow, pecan, and cypress are the most desirable species. These trees are used for sawtimber and pulpwood. In the uplands desirable trees include oak, hickory, sweetgum, poplar, and walnut. Most of the forests have been cut over, and few areas are receiving adequate management. In 1959 the forest products sold amounted to \$104,109.

Some soils, and sand and gravel bars, along the Mississippi River are a source of sand and gravel. On the uplands, the Coastal-Plain formation beneath the thick loess is a source of gravel, clay, and sand.

Agriculture

Although some of the farmers depend on industry for part of their income, Fulton County is chiefly an agricultural county. At the time of settlement, nearly all of the county's 131,200 acres was forested. The 1959 United States Census of Agriculture lists 111,438 acres as land in farms, but only about 100,000 acres of this as cleared land used primarily for crops and pasture. The value of all crops sold in 1959 was \$3,372,940, and that of livestock and livestock products was \$2,061,678.

Number and types of farms.—In 1959 the average size of a farm in Fulton County was 181.2 acres. The number of farms in the county of specified acreages was as follows:

	Number of farms
Under 10 acres	63
10 to 49 acres	103
50 to 69 acres	46
70 to 99 acres	66
100 to 139 acres	53
140 to 179 acres	56
180 to 219 acres	32
220 to 259 acres	25
260 to 400 acres	62
500 to 999 acres	34
1,000 or more acres	15

In 1959 the farms of the county were grouped by type as follows:

	Number of farms
Field crop	188
Fruit and nut	2
Poultry	10
Dairy	25
Livestock	191
General	19
Miscellaneous and unclassified	180

According to the 1959 Census of Agriculture, there were 615 farms in the county. Full owners operated 287 farms; part owners, 126; and managers, 4. In 1959 a total of

198 farms, or 32.2 percent of the farms in the county, were operated by tenants.

Equipment and facilities on farms of Fulton County were reported in 1959 as follows:

	Number
Grain combines	218
Cornpickers	194
Pickup balers	81
Trucks	425
Tractors	810
Automobiles	647
Telephones	439
Home freezers	388

In 1959 fertilizer was used on 379 farms. A total of 21,455 acres received fertilizer, and the amount applied to this acreage was 2,395 tons.

Crops.—Table 11 lists the acreage in the county that was planted to important crops in stated years. Corn and soybeans are grown on most farms. Cotton is grown largely in the western part of the county. The acreage in alfalfa, mixed clover and grass, and lespedeza is about equal.

TABLE 11.—*Acreage of the principal crops and number of fruit and pecan trees of bearing age*

Crop	1954	1959
Soybeans harvested for beans	16,558	19,529
Corn for all purposes	19,951	19,515
Cotton harvested	7,970	7,210
Hay crops, total	5,009	5,279
Lespedeza	669	1,703
Clover, timothy, and mixtures of clover and grasses	282	1,627
Alfalfa	2,161	1,480
Other hay cut	1,897	469
Small grains harvested:		
Wheat	2,409	2,477
Barley	573	1,071
Fruit trees ¹	1,470	4,555
Pecan trees	7,377	31,063

¹ Mostly apple and cherry trees.

Livestock.—Table 12 lists the number of livestock in the county in 1954 and 1959. Horses and mules have gradually decreased in number because of the increasing use of tractors.

TABLE 12.—*Livestock on farms in stated years*

Livestock	1954	1959
Cattle and calves	12,655	12,798
Horses and mules	713	324
Hogs and pigs	14,271	20,064
Sheep and lambs	4,825	3,836
Chickens ¹	33,988	19,214

¹ Four months old or older.

Industry

The city of Fulton is the headquarters of the Mississippi Division of the Illinois Central Railroad. A seed company has its main office and a packaging plant in Fulton. Other main industries in Fulton are meat packaging and processing, clothing manufacturing, milk processing and distributing, and sausage making.

In or near Hickman are sawmills, cotton gins, farm-implement dealers, a pecan processing plant, a garment manufacturer, and a sand and gravel company.

Close to Fulton County are industrial towns, such as Union City, Tenn., and Mayfield, Ky.

Community Facilities

Fulton County High School is located near Hickman, and grade schools are located at Cayce, Hickman, and Western. All parts of the county have school bus service. The city of Fulton has both a high school and a grade school.

All towns and communities have churches, and nearly all major denominations are represented in the county.

Fulton County has all the common types of transportation. Hickman, on the Mississippi River, is served by two barge lines that have docking facilities. Fulton is the main junction of the north-south line of the Illinois Central Railroad. Hickman is also serviced by this railroad. The Gulf, Mobile and Ohio Railroad goes through Cayce. U.S. Highway 51 goes through Fulton and to the east side of the county; State Highways 94 and 166 connect Fulton to Hickman and the western part of the county.

Telephones are available throughout the county. The Rural Electrification Administration provides electricity to all the county except Fulton and Hickman. These cities get their electricity from the Kentucky Utilities Company. Both cities have natural gas. Fulton has a radio station.

Reelfoot Lake, just across the Tennessee Line, and the Mississippi River afford the county fishing, hunting, and boating.

Climate⁴

Fulton County has a wide range in temperature, rainfall, wind, and humidity, but the range is within limits suitable for varied plant and animal life. Occasional hot spells in summer and cold spells in winter bring the greatest extremes in temperature, but there is considerable variability in all seasons. The temperature rises to 90° F. or higher on about 55 days during an average year. A temperature of 100° is reached about once each year, in June, July, August, or September.

The temperature is down to the freezing point on about 60 nights in an average winter, but, except on about 8 days a year, it rises above 32° during daytime. Thus, a daily freeze-thaw cycle is normal for cold weather. Per-

haps once a year, or even less, the temperature will drop below 0°.

The average length of the growing season in Fulton County—time from the last light freeze in spring to the first light freeze in fall—is 197 days. About 5 years out of 10 will have a growing season of 186 to 208 days, and 8 years out of 10 will have a growing season that will range from 176 to 218 days.

Fulton County has an average annual rainfall of 47.4 inches, which is sufficient for agricultural production. During an ordinary year, the heaviest 1-hour rainfall is about 1.35 inches. There is a 30-percent chance that such a 1-hour rain will occur in July or August, but less than a 1-percent chance of its coming in November through January. Once in 10 years, a 24-hour total of 5.2 inches may be expected. There is about a 2-percent chance that this much rain will fall in any July, but a chance of 1 percent or less that this will happen in any other month.

Thunderstorms occur on an average of 52 days per year. They are most frequent from March through November but may occur in any month. Thunderstorms bring most of the short, intense rainfall during summer. Less intense rainfall lasting for several days occurs late in spring and delays early tillage. These long, slow spring rains are those most apt to cause local floods because they come when soils are frozen, snow covered, or saturated. Measurable amounts of precipitation occur in this county on an average of 114 days each year. Fortunately, long periods of mild, sunny weather are typical in fall, when harvesting needs to be completed.

Although the average yearly snowfall is 8.2 inches, the ground is seldom covered with snow for more than a few days. During a normal year, no more than three snowfalls will amount to more than 1 inch.

Relative humidity depends on the temperature, as well as on the moisture content of the air, and therefore is extremely variable. An average for the early morning hours is 82 percent; and for early afternoon, 60 percent. Early morning readings can range from 55 percent to 100 percent. Afternoon readings are seldom more than 75 percent, but can fall to 30 percent, or, infrequently, to less.

Winds, prevailingly from the southwest, average 8.5 miles per hour. Calm periods seldom persist for as long as 24 hours. Peak gusts, ranging from 50 to 65 miles per hour, generally occur at the beginning of heavy thunderstorms.

During an average year there are 120 clear days, 140 cloudy days, and 105 days with partly cloudy skies.

Table 13 shows monthly and annual values of average high, low, and mean temperatures, as well as the extremes that have been recorded. The data on precipitation show monthly averages, monthly extremes, and the greatest 24-hour amount of rainfall on record.

Table 14 is an aid in determining the probable risk of frost damage to crops. Critical temperatures of individual crops must, of course, be known. Given in the table are probabilities of light, moderate, and severe freezes after various dates in spring and before specified dates in fall.

⁴ By O. K. ANDERSON, meteorologist, and staff, U.S. Weather Bureau, Louisville, Ky.

TABLE 13.—Temperature and
[Temperature data based on a 36-year record; rainfall data based

Month	Temperature					
	Average	Average maximum	Average minimum	Highest on record	Lowest on record	
January	36.9	46.7	27.1	76	1/18/29	-17
February	39.9	50.2	29.6	79	2/28/18	-10
March	49.1	60.4	37.7	90	3/25/29	1
April	58.2	69.7	46.7	93	4/15/24	20
May	66.9	78.2	55.6	98	5/29/26	31
June	75.3	86.6	63.9	103	6/19/36	42
July	78.7	90.3	67.2	110	7/27/30	44
August	77.6	89.5	65.7	110	8/9/30	43
September	71.7	84.4	58.9	105	9/4/25	33
October	61.2	74.2	48.2	94	10/6/41	24
November	48.4	59.3	37.4	82	11/1/43	-2
December	39.9	49.5	30.2	75	12/26/42	-5
Annual	58.6	69.9	47.4	110	-----	-17

¹ Trace. ² Also in 1918. ³ Also in 1928.

TABLE 14.—Probabilities of last freeze in spring and first freeze in fall

[During a light freeze, the temperature ranges from 28° F. through 32°, and usually only the tenderest plants are killed. During a moderate freeze, the temperature ranges from 24° to 28°, and most plants are damaged to some extent. During a severe freeze, the temperature is below 24° and most cultivated plants are killed or heavily damaged]

Probability ¹	Dates for given probability		
	Light freeze	Moderate freeze	Severe freeze
Spring:			
5 years in 10, after	Apr. 7	Mar. 20	Mar. 5
2 years in 10, after	Apr. 16	Mar. 31	Mar. 17
1 year in 10, after	Apr. 22	Apr. 6	Mar. 23
Fall:			
5 years in 10, before	Oct. 21	Oct. 31	Nov. 10
2 years in 10, before	Oct. 11	Oct. 21	Oct. 30
1 year in 10, before	Oct. 6	Oct. 17	Oct. 24

¹ Number of chances in 10 that a freeze will occur. For example, the last light freeze in spring will occur after April 7 in 5 years out of 10 years; after April 16 in 2 years out of 10 years; and after April 22 in 1 year out of 10 years. The first light freeze in fall will occur before October 21 in 5 years out of 10 years, before October 11 in 2 years out of 10 years, and before October 6 in 1 year out of 10.

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precipitation, Fulton County, Ky.

on a 38-year record; snowfall data based on a 17-year record]

Precipitation											
Average	Greatest amount on record		Lowest amount on record		Greatest amount in 24-hour period		Average snowfall	Greatest snowfall on record			
Inches	Inches	Year	Inches	Year	Inches	Date	Inches	Inches	Year		
4.87	17.05	1937	0.97	1944	4.55	1/21/37	2.7	9.5	1940		
3.58	7.87	1939	.17	1947	5.17	2/14/49	2.8	8.0	1940		
4.84	12.23	1935	.80	1918	3.10	3/17/19	.9	6.0	1940		
4.26	8.15	1927	1.48	1938	2.92	4/2/45	(1)	(1)	1936		
4.28	9.35	1927	.93	1936	3.65	5/12/18	0	0	-----		
3.82	17.78	1928	.70	1903	3.10	6/28/28	0	0	-----		
3.97	12.50	1933	0	1930	3.85	7/21/25	0	0	-----		
3.55	8.16	1950	.25	1936	3.07	8/23/42	0	0	-----		
3.04	9.78	1934	0	1928	4.00	9/20/32	0	0	-----		
3.15	9.58	1925	.15	1920	3.16	10/27/47	0	0	-----		
3.93	8.98	1946	.57	1904	3.68	11/2/46	.3	3.0	1936		
4.16	8.75	1923	.98	1925	4.67	12/15/48	1.5	5.2	1945		
47.45	17.78	-----	0	-----	5.17	-----	8.2	9.5	-----		

^a Also in 1928, and in 1938.

^b Also in 1935.

^c Also in 1924.

Glossary

Acidity. See Reaction, soil.

Aggregate. A mass or cluster of many fine soil particles. Many properties of the aggregate differ from those of an equal mass of unaggregated soil. (See Structure, soil; Structureless; and Texture.)

Alluvium. Fine material, such as sand, silt, or clay, deposited on land by streams.

Available water holding capacity. The amount of water that can be held in a soil in a form available to plants.

Bisequum profile. A sequence of an eluvial horizon and its underlying illuvial horizon, if present, is a sequum. If two sequa are present in a single soil, the soil has a bisequum profile.

Bottom land. Lowland formed by an alluvial deposit along a stream or in a lake basin; a flood plain.

Clay. (1) As a soil separate, mineral particles of soil less than 0.002 millimeter (0.000079 inch) in diameter. (2) As a textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Consistence, soil. The combination of properties of soil material that determines its resistance to crushing and its ability to be molded or changed in shape. Consistence depends mainly on the strength and nature of the forces of attraction between soil particles. It varies widely with differences in moisture content; thus, a soil aggregate, or clod, may be hard when dry and plastic when wet.

Terms used to describe consistence when the soil is wet are—

Plastic. Easily rolled between thumb and forefinger into a wire or thin rod of soil without breaking; moderate pressure is required to deform the soil mass. Plastic soils are high in content of clay and are difficult to till.

Sticky. Adheres to thumb and forefinger after pressure. Terms used to describe consistence when the soil is moist are—

Firm. Crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Firm soils are likely to be difficult to till.

Friable. Crushes easily under gentle to moderate pressure between thumb and forefinger and coheres when pressed together. Friable soils are easily tilled.

Loose. Noncoherent when moist or dry. Loose soils are generally coarse textured and easily tilled.

Terms used to describe consistence when the soil is dry are—

Hard. Moderately resistant to pressure; can be broken in the hands without difficulty but is barely breakable between thumb and forefinger.

Soft. Very weakly coherent and fragile and breaks to powder or individual grains under very slight pressure. Terms used to describe consistence when the soil is wet, moist, and dry—

Brittle. Breaks with a sharp, clean fracture. Shatters into cleanly broken, hard fragments if struck with a sharp blow.

Erosion. The wearing away of the land surface by wind, running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition (or tilth) of the soil are favorable.

Flood plain. Nearly level land, consisting of stream sediment, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A dense and brittle subsurface horizon very low in organic matter and clay but rich in silt or very fine sand. The layer seems to be cemented when it is dry, is hard or very hard, and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. A fragipan is a few inches to several feet thick; it generally occurs below the B horizon, 15 to 40 inches below the surface.

Genesis, soil. The manner in which the soil originated, with special reference to the processes responsible for the development of the solum, or true soil, from the unconsolidated parent material.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes and that differs in one or more ways from adjacent horizons in the same profile. The relative positions of the several soil horizons in the soil profile and their designations are—

A horizon. The master horizon consisting of (1) one or more mineral horizons of maximum organic accumulation; or (2) surface or subsurface horizons that are lighter in color than the underlying horizon and have lost clay minerals, iron, and aluminum, with resultant concentration of the more resistant minerals; or (3) horizons belonging to both of the categories.

B horizon. The master horizon of altered material characterized by (1) an accumulation of clay, iron, or aluminum, with accessory organic matter; or (2) blocky or prismatic struc-

ture together with other characteristics, such as stronger colors, unlike those of the A horizon or the underlying horizons of nearly unchanged material; or (3) characteristics of both these categories. Commonly, the lower limit of the B horizon corresponds with the lower limit of the solum.

C horizon. A layer of unconsolidated material, relatively little affected by organisms and presumed to be similar in chemical, physical, and mineralogical composition to the material from which at least a part of the solum has developed.

D horizon. Any stratum underlying the C horizon, or the B if no C is present, which is unlike the C horizon or unlike the material from which the solum has been formed. Any major horizon (A, B, C, or D) may or may not consist of two or more subdivisions or subhorizons, and each subhorizon in turn may or may not have subdivisions.

Moisture-supplying capacity. The relative capacity of the soil to take in and supply moisture in amounts favorable to most plants. It reflects runoff, rate of infiltration, available water holding capacity, root zone, and root distribution. Relative moisture-supplying capacity is expressed as *high, moderately high, moderately low, low, or very low*.

Morphology, soil. The physical constitution of the soil, including the texture, structure, consistence, color, and other physical, chemical, mineralogical, and biological properties of the various soil horizons that make up the soil profile.

Mottles, soil. Contrasting color patches that vary in number and size, commonly caused by poor drainage. Descriptive terms are as follows:

Abundance. Few, common, and many.

Contrast. Faint, distinct, and prominent.

Size. Fine, medium, and coarse.

Natural drainage. The condition that existed during the development of the soil, as opposed to altered drainage. Drainage is generally altered by artificial means or by irrigation but may be altered by sudden deepening of channels or sudden blocking of drainage outlets. The following relative terms are used to describe natural drainage: *excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained*.

Nutrients, plant. The elements taken in by the plant, essential to its growth, and used by it in the elaboration of its food and tissue. Nutrients obtained from the soil include nitrogen, phosphorus, calcium, potassium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps others; nutrients obtained mainly from air and water are carbon, hydrogen, and oxygen.

Old natural levee. The higher areas of old alluvium adjacent to streams where coarse-textured and medium-textured sediments have settled from suspension in water.

Parent material. The unconsolidated mass from which the soil has formed.

Permeability, soil. That quality of a soil that enables it to transmit water and air. The permeability of a soil may be limited by the presence of one nearly impermeable horizon, even though the others are permeable. Moderately permeable soils transmit air and water readily, a condition that is favorable for the growth of roots. Slowly permeable soils allow water and air to move so slowly that root growth is restricted. Rapidly permeable soils transmit air and water rapidly, and root growth is good. Permeability is measured in terms of rate of flow of water through a unit cross section of saturated soil in unit time. Rates are expressed in inches per hour as follows:

	<i>Inches per hour</i>
Very slow-----	Less than 0.05
Slow-----	0.05 to 0.20
Moderately slow-----	0.20 to 0.80
Moderate-----	0.80 to 2.50
Moderately rapid-----	2.50 to 5.00
Rapid-----	5.00 to 10.00
Very rapid-----	More than 10.00

Phase, soil. A subdivision of the soil type covering variations that are chiefly in such external characteristics as relief, stoniness, or accelerated erosion.

Productivity (of soil). The present capability of a soil for producing a specified plant or sequence of plants under a specified system of management. It is measured in terms of output, or harvest, in relation to input of production for the specific kind of soil under a specified system of management.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. (Also see *Horizon, soil*.)

Reaction, soil. The degree of acidity or alkalinity of a soil mass, expressed in words or pH values as follows:

	<i>pH</i>	<i>pH</i>
Extremely acid----- below 4.5	Neutral -----	6.6-7.3
Very strongly acid----- 4.5-5.0	Mildly alkaline-----	7.4-7.8
Strongly acid----- 5.1-5.5	Moderately alkaline-----	7.9-8.4
Medium acid----- 5.6-6.0	Strongly alkaline-----	8.5-9.0
Slightly acid----- 6.1-6.5	Very strongly alkaline-----	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Root zone. The part of the soil that is penetrated, or can be penetrated by plant roots. A high water table, a high content of clay, a fragipan, or a shallow depth to bedrock are features that limit the root zone. In this report, the root zone is described as *very shallow, shallow, moderately deep, and deep*.

Sand. (1) As a soil separate, rock or mineral fragments that are 0.05 millimeter (0.002 inch) to 2.0 millimeters (0.079 inch) in diameter. Sand grains are generally quartz, but they may be of any mineral composition. (2) As a soil textural class, soil material that is 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils that have genetic horizons similar in their differentiating characteristics and arrangement within the profile, except for texture of the surface soil. The soils in a series formed from similar parent materials.

Silt. (1) As a soil separate, mineral particles that are 0.05 millimeter (0.002 inch) to 0.002 millimeter (0.000079 inch) in diameter. (2) As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slack-water areas. Bottom lands where clay sediments have settled out of suspension.

Soil. The natural medium for the growth of land plants. A soil is a natural, three-dimensional body on the earth's surface that has properties resulting from the integrated effects of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

Solum. The genetic soil developed by the forces of soil formation. In well-developed soils, the A and B horizons, or the upper part of the profile above the parent material.

Structure, soil. The arrangement of the individual soil particles into aggregates that have definite shape and pattern. Structure is described in terms of grade (*weak, moderate, and strong*), which expresses the degree of distinctness and durability of the aggregates; by class (*very fine or very thin, fine or thin, medium, coarse or thick, and very coarse or very thick*), which indicates the size of the aggregates; and by type (*blocky, subangular blocky, columnar, crumb, granular, platy, and prismatic*), which describes the shape of the aggregates.

Blocky, angular. The particles are arranged around a point and are bounded by flat or rounded surfaces that are casts of the molds formed by the faces of surrounding peds; the aggregates are shaped like blocks. The surfaces join at sharp angles. If the term "blocky" is used alone, angular blocky is understood.

Blocky, subangular. The aggregates have some rounded and some flat surfaces; the upper faces are rounded.

Columnar. The particles are arranged around a vertical line and are bounded by relatively flat surfaces; the height of the aggregates is greater than the width, and the upper ends are rounded.

Crumb. The particles are arranged around a point into aggregates that are irregular but tend toward a spherical shape; the aggregates are soft, small, and porous.

Granular. The aggregates are roughly spherical, firm, and small; they may be either hard or soft but generally are more firm and less porous than crumb and are without the distinct faces of blocky structure.

Platy. The particles are arranged around a plane, generally horizontal; the aggregates are flaky or platelike.

Prismatic. The particles are arranged around a vertical line and are bounded by flat surfaces; the upper ends are not rounded.

Structureless. A condition in which there are no observable aggregates or no definite orderly arrangement of natural lines of weakness—*massive* if coherent and *single grain* if noncoherent.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches thick.

Texture, soil. The relative proportions of the various size groups of individual soil grains in a mass of soil; specifically, the proportions of sand, silt, and clay. Soil textural classes named in classifying the soils in this county are *silt loam*, *silty clay loam*, *fine sandy loam*, *loamy fine sand*, and *clay*.

A coarse-textured soil is one high in content of sand; a fine-textured soil has a large proportion of clay.

Topsoil. Presumably fertile soil material, rich in organic matter, that is used to topdress roadbanks, lawns, and gardens.

Type, soil. A subdivision of the soil series based on texture of the surface soil.

Workability. The ease with which tillage, harvesting, and other farming operations can be accomplished.

GUIDE TO MAPPING UNITS

[See table 1, p. 6, for the approximate acreage and proportionate extent of the soils. See table 2, p. 28, for estimated average acre yields, and table 3, p. 30, for potential soil productivity for wood products. For information significant to soil engineering, see pp. 36-49]

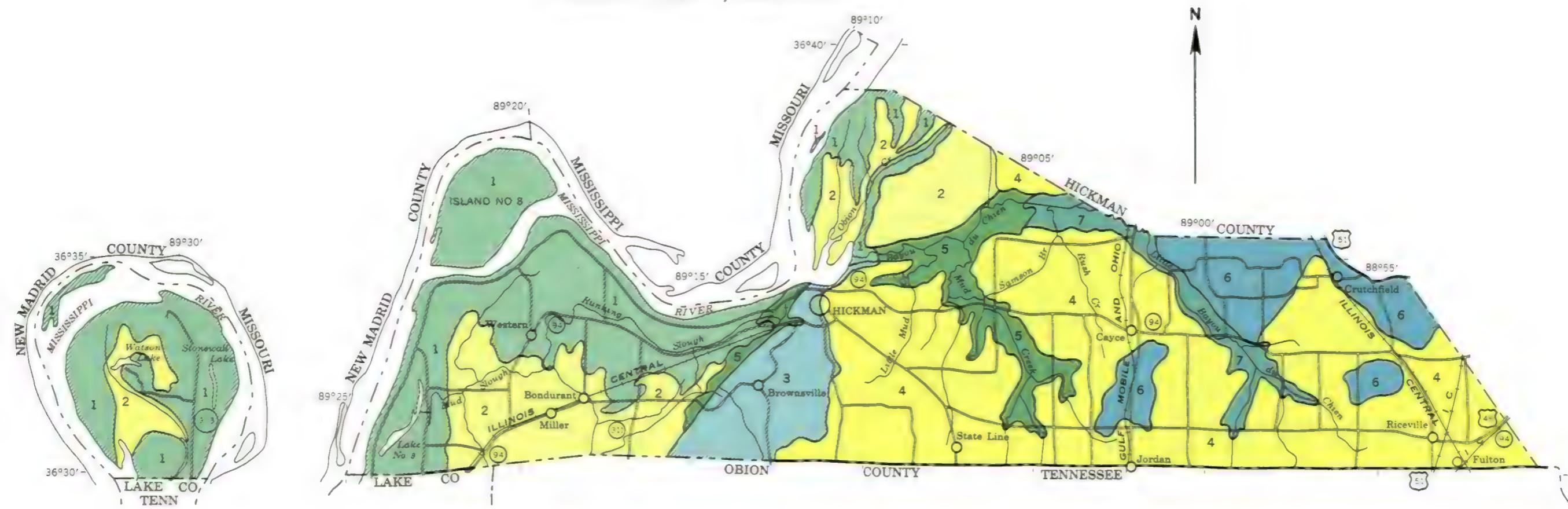
Symbol	Mapping unit	Page	Woodland		
			Capability unit	Number	Page
Ad	Adler silt loam	6	I-2	20	8
Ba	Beulah fine sandy loam	7	I-3	20	8
Bd	Birds silt loam	7	IIIw-5	24	3
Bo	Bosket silt loam	7	I-3	20	8
CaA	Calloway silt loam, 0 to 2 percent slopes	8	IIIw-1	23	7
CaB	Calloway silt loam, 2 to 6 percent slopes	8	IIIw-3	24	9
CaB2	Calloway silt loam, 2 to 6 percent slopes, eroded	8	IIIw-3	24	9
CbA	Calloway silt loam, terrace, 0 to 2 percent slopes	8	IIIw-1	23	6
CbB	Calloway silt loam, terrace, 2 to 6 percent slopes	8	IIIw-3	24	6
Cc	Collins silt loam	8	I-2	20	8
Cm	Commerce silt loam	9	I-2	20	8
Co	Commerce silt loam, low	9	IIw-4	21	4
Cr	Commerce silty clay loam	9	IIw-4	21	8
Cs	Commerce silty clay loam, low	9	IIw-4	21	4
Cv	Crevasse loamy fine sand	9	IIIs-1	25	5
Db	Dubbs silt loam	10	I-3	20	8
Du	Dundee silty clay loam	10	IIw-4	21	8
Fa	Falaya silt loam	11	IIw-4	21	3
Fo	Forestdale silty clay loam	11	IIIw-9	25	4
GrA	Grenada silt loam, 0 to 2 percent slopes	12	IIw-2	21	9
GrB	Grenada silt loam, 2 to 6 percent slopes	11	IIe-6	21	9
GrB2	Grenada silt loam, 2 to 6 percent slopes, eroded	12	IIe-6	21	9
GrB3	Grenada silt loam, 2 to 6 percent slopes, severely eroded	12	IIIe-11	23	10
GrC2	Grenada silt loam, 6 to 12 percent slopes, eroded	12	IIIe-8	22	9
GrC3	Grenada silt loam, 6 to 12 percent slopes, severely eroded	12	IVe-13	25	10
Gu	Gullied land	12	VIIe-4	27	13
Hn	Henry silt loam	12	IVw-1	26	7
Ht	Henry silt loam, terrace	13	IVw-1	26	6
LnA	Loring silt loam, 0 to 2 percent slopes	13	I-3	20	11
LnB	Loring silt loam, 2 to 6 percent slopes	13	IIe-2	20	11
LnB2	Loring silt loam, 2 to 6 percent slopes, eroded	13	IIe-2	20	11
LnC2	Loring silt loam, 6 to 12 percent slopes, eroded	13	IIIe-2	22	11
LnD2	Loring silt loam, 12 to 20 percent slopes, eroded	13	VIe-7	26	11
LoB3	Loring silty clay loam, 2 to 6 percent slopes, severely eroded	13	IIIe-12	23	12
LoC3	Loring silty clay loam, 6 to 12 percent slopes, severely eroded	14	IVe-14	26	12
LoD3	Loring silty clay loam, 12 to 20 percent slopes, severely eroded	14	VIe-2	26	12
Ma	Made land	14	-----	-----	-----
MmA	Memphis silt loam, 0 to 2 percent slopes	14	I-3	20	11
MmB	Memphis silt loam, 2 to 6 percent slopes	14	IIe-2	20	11
MmB2	Memphis silt loam, 2 to 6 percent slopes, eroded	14	IIe-2	20	11
MmC2	Memphis silt loam, 6 to 12 percent slopes, eroded	14	IIIe-2	22	11
MmD2	Memphis silt loam, 12 to 20 percent slopes, eroded	14	VIe-7	26	11
MmF	Memphis silt loam, 30 to 65 percent slopes	14	VIIe-1	27	11
MpC3	Memphis silty clay loam, 6 to 12 percent slopes, severely eroded	14	IVe-9	25	12
MpD3	Memphis silty clay loam, 12 to 20 percent slopes, severely eroded	14	VIe-2	26	12
MpE3	Memphis silty clay loam, 20 to 30 percent slopes, severely eroded	15	VIe-2	26	12
Pa	Patton silt loam	15	IIw-5	22	2
Po	Patton silt loam, overwash	15	IIw-4	21	2
Rg	Riverwash, gravelly	15	VIIIs-4	27	13
Rh	Riverwash, sandy	15	VIIIs-4	27	13
Rm	Robinsonville fine sandy loam	16	I-1	19	8
Rn	Robinsonville silt loam	15	I-1	19	8
Ro	Robinsonville silty clay loam	16	IIIs-3	22	8
Sh	Sharkey clay	16	IIIw-6	24	1
So	Sharkey silty clay loam, overwash	16	IIIw-7	24	1
Sw	Swamp	16	VIIw-1	27	13
Tu	Tunica clay	16	IIIw-9	25	1
Wa	Wakeland silt loam	17	IIw-4	21	3
Wf	Waverly-Falaya silt loams	17	IIIw-5	24	3

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GENERAL SOIL MAP
FULTON COUNTY, KENTUCKY



SOIL ASSOCIATIONS

1 Commerce-Robinsonville association: Nearly level, somewhat poorly drained to well-drained soils on the Mississippi River flood plain

2 Sharkey-Tunica association: Level, poorly drained and somewhat poorly drained, clayey soils on slack-water flats of the Mississippi River flood plain

3 Memphis-Loring association: Well-drained soils on sloping to steep sides and gently sloping tops of loessial bluffs

4 Grenada-Calloway-Loring-Memphis association: Gently sloping, somewhat poorly drained to well-drained soils on loessial uplands dissected by many small drains

5 Patton-Wakeland-Birds-Calloway association: Very poorly drained to somewhat poorly drained soils on nearly level flood plains, and nearly level to gently sloping soils on terraces

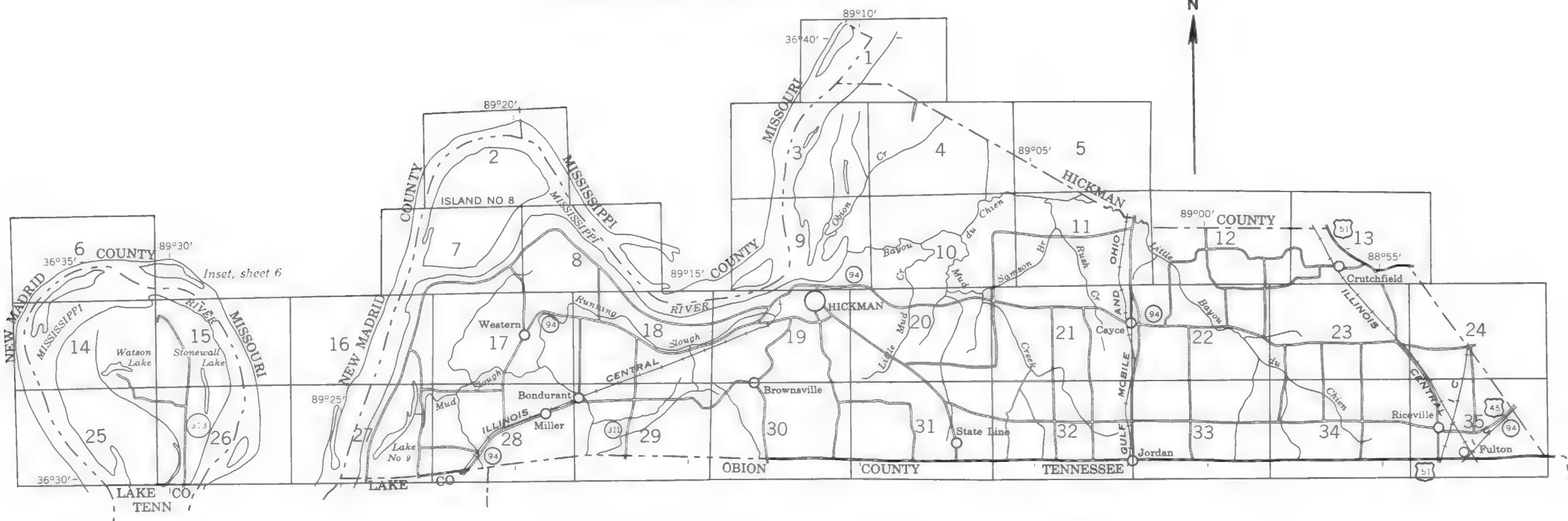
6 Loring-Memphis association: Well drained and moderately well drained soils in thick loess of the sloping uplands

7 Waverly-Falaya-Calloway association: Poorly drained and somewhat poorly drained soils on acid, silty alluvium of the level flood plains and nearly level to gently sloping terraces

Scale 1:190,080

1 0 1 2 3 4 Miles

INDEX TO MAP SHEETS
FULTON COUNTY, KENTUCKY



Original text from each individual map sheet read:

This map is one of a set compiled in 1962 as part of a soil survey by the Soil Conservation Service,
United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.

Scale 1:190,080
 1 0 1 2 3 4 Miles

SOIL LEGEND

The first capital letter of each symbol is the first one of the soil name. A second capital letter, A, B, C, D, E, or F, shows the slope. Symbols without a slope letter may be those of nearly level soils or land types, such as Tunica clay, or Swamp; or of land types that have a considerable range in slope, such as Gullied land. A final number, 2 or 3, in the symbol shows that the soil is eroded or severely eroded.

SYMBOL	NAME
Ad	Adler silt loam
Ba	Beulah fine sandy loam
Bd	Birds silt loam
Bo	Bosket silt loam
CaA	Calloway silt loam, 0 to 2 percent slopes
CaB	Calloway silt loam, 2 to 6 percent slopes
CaB2	Calloway silt loam, 2 to 6 percent slopes, eroded
CbA	Calloway silt loam, terrace, 0 to 2 percent slopes
CbB	Calloway silt loam, terrace, 2 to 6 percent slopes
Cc	Collins silt loam
Cm	Commerce silt loam
Co	Commerce silt loam, low
Cr	Commerce silty clay loam
Cs	Commerce silty clay loam, low
Cv	Crevasse loamy fine sand
Db	Dubbs silt loam
Du	Dundee silty clay loam
Fa	Falaya silt loam
Fo	Forestdale silty clay loam
GrA	Grenada silt loam, 0 to 2 percent slopes
GrB	Grenada silt loam, 2 to 6 percent slopes
GrB2	Grenada silt loam, 2 to 6 percent slopes, eroded
GrB3	Grenada silt loam, 2 to 6 percent slopes, severely eroded
GrC2	Grenada silt loam, 6 to 12 percent slopes, eroded
GrC3	Grenada silt loam, 6 to 12 percent slopes, severely eroded
Gu	Gullied land
Hn	Henry silt loam
Ht	Henry silt loam, terrace
LnA	Loring silt loam, 0 to 2 percent slopes
LnB	Loring silt loam, 2 to 6 percent slopes
LnB2	Loring silt loam, 2 to 6 percent slopes, eroded
LnC2	Loring silt loam, 6 to 12 percent slopes, eroded
LnD2	Loring silt loam, 12 to 20 percent slopes, eroded
LoB3	Loring silty clay loam, 2 to 6 percent slopes, severely eroded
LoC3	Loring silty clay loam, 6 to 12 percent slopes, severely eroded
LoD3	Loring silty clay loam, 12 to 20 percent slopes, severely eroded
Ma	Made land
MmA	Memphis silt loam, 0 to 2 percent slopes
MmB	Memphis silt loam, 2 to 6 percent slopes
MmB2	Memphis silt loam, 2 to 6 percent slopes, eroded
MmC2	Memphis silt loam, 6 to 12 percent slopes, eroded
MmD2	Memphis silt loam, 12 to 20 percent slopes, eroded
MmF	Memphis silt loam, 30 to 65 percent slopes
MpC3	Memphis silty clay loam, 6 to 12 percent slopes, severely eroded
MpD3	Memphis silty clay loam, 12 to 20 percent slopes, severely eroded
MpE3	Memphis silty clay loam, 20 to 30 percent slopes, severely eroded
Pa	Patton silt loam
Po	Patton silt loam, overwash
Rg	Riverwash, gravelly
Rh	Riverwash, sandy
Rm	Robinsonville fine sandy loam
Rn	Robinsonville silt loam
Ro	Robinsonville silty clay loam
Sh	Sharkey clay
So	Sharkey silty clay loam, overwash
Sw	Swamp
Tu	Tunica clay
Wa	Wakeland silt loam
Wf	Waverly-Falaya silt loams

WORKS AND STRUCTURES

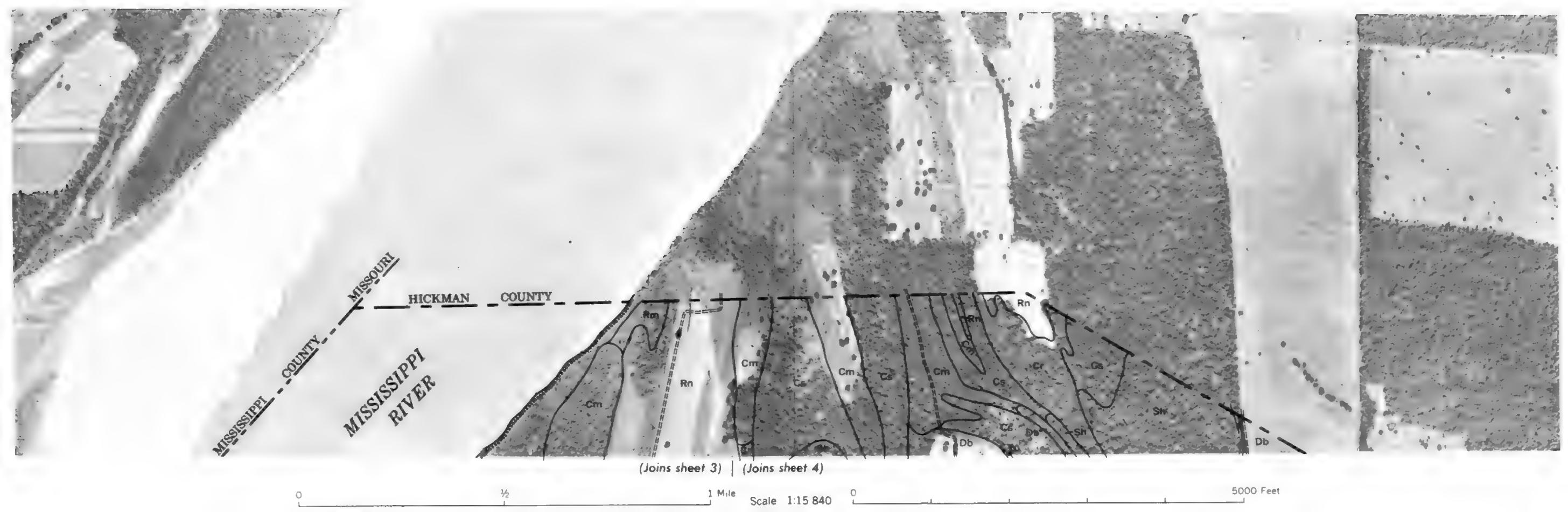
Highways and roads	
Dual	—
Good motor	=====
Poor motor	====
Trail	- - - - -
Highway markers	
National Interstate	
U. S.	
State	
Railroads	
Single track	- + - + - + -
Multiple track	- * - * - * -
Abandoned	- + - + - + -
Bridges and crossings	
Road	—
Trail, foot	- - - - -
Railroad	—
Ferries	—
Ford	- - - - -
Grade	- + - + - + -
R. R. over	—
R. R. under	—
Tunnel	==> = = = < ==
Buildings	
School	
Church	
Station	—
Mines and Quarries	
Mine dump	
Pits, gravel or other	
Power lines	
Pipe lines	- - - - -
Cemeteries	
Dams	
Levees	
Tanks	
Oil wells	
Sawmill	

CONVENTIONAL SIGNS

SOIL SURVEY DATA
Map constructed 1963 by C. A. Johnson, Soil Conservation Service, from aerial photographs. Controlled on Kentucky plane coordinate system, zone 15, Lambert conformal conic projection.



Soil map constructed 1963 by Cartographic Division, Soil Conservation Service, USDA, from 1959 aerial photographs. Controlled mosaic based on Kentucky plane coordinate system, south zone, Lambert conformal conic projection. 1927 North American datum.

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2

N



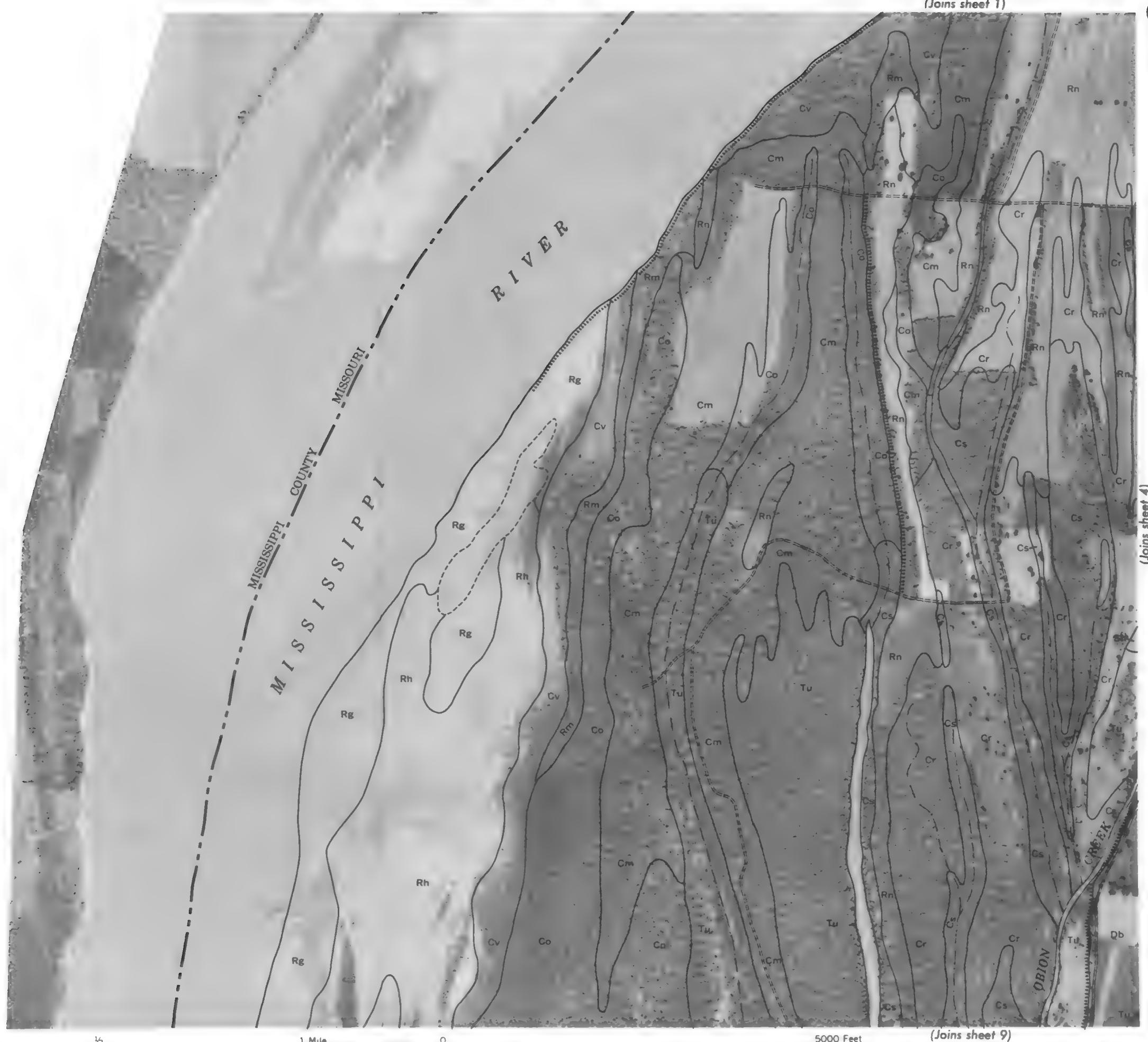
FULTON COUNTY, KENTUCKY — SHEET NUMBER 3

(Joins sheet 1)

三

R I V E R

MISSISSIPPI - COUNTY - MISSOURI



(Joins sheet 1)

4

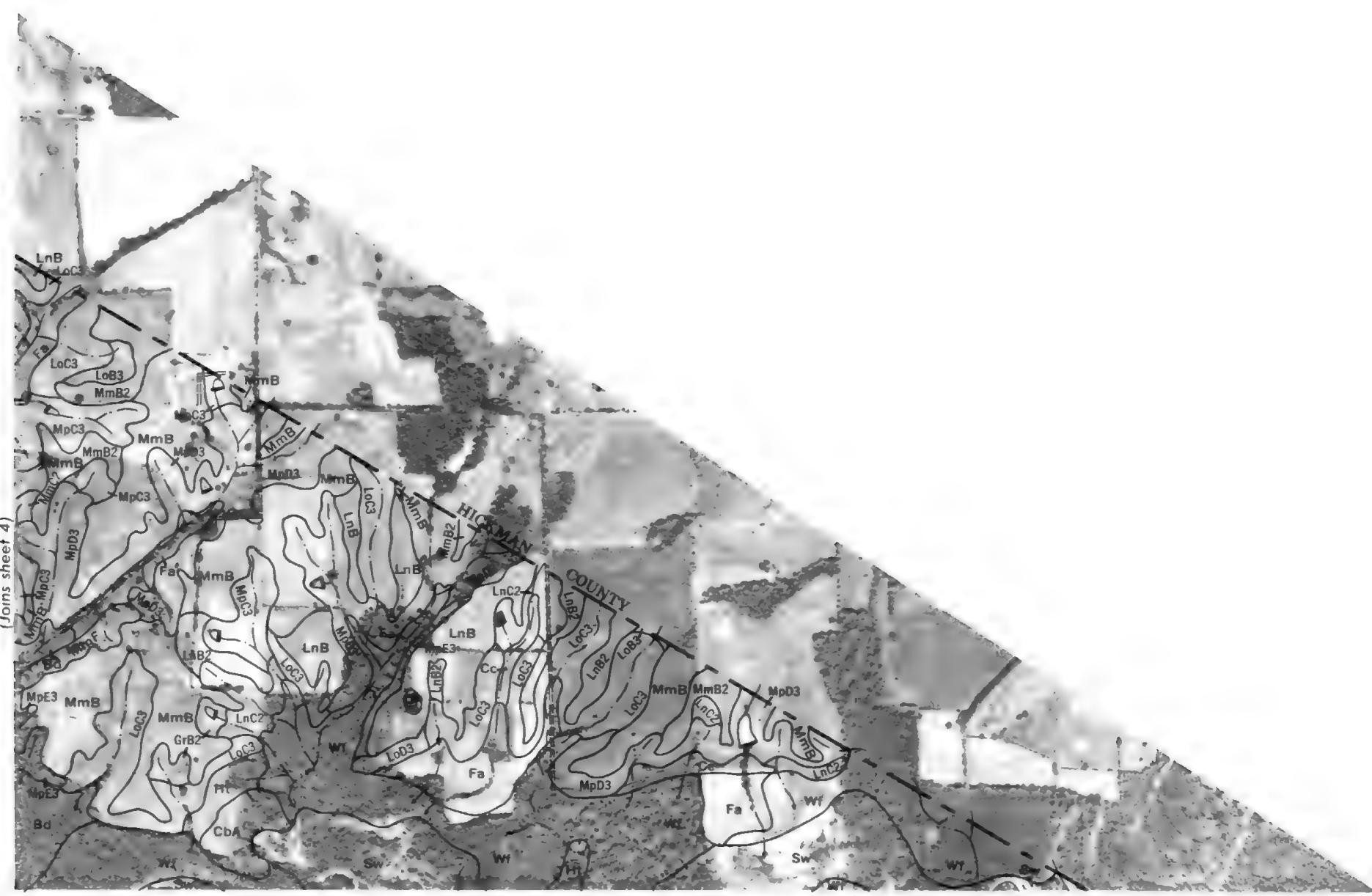
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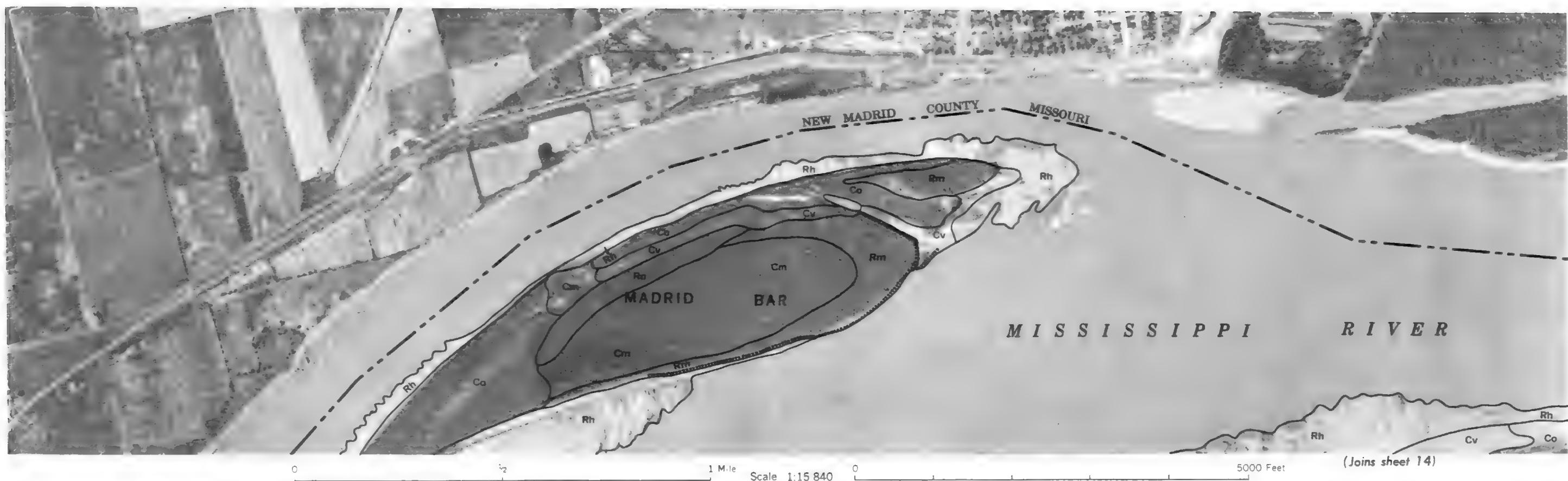
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1



6

N
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MISSISSIPPI - NEW MADRID - COUNTY - MISSOURI
RIVER



FULTON COUNTY, KENTUCKY — SHEET NUMBER 8

(Joins sheet 2)

8

N

CHUTE OF ISLAND NO 8

(Joins sheet 7)



0

1 Mile

5000 Feet

(Joins sheet 17)

(Joins sheet 18)

Scale 1:15 840

FULTON COUNTY, KENTUCKY - SHEET NUMBER 9

(Joins sheet 3)

9

M I S S I S S I P P I COUNTY - - - Miss-

Hickman

- V E R

Bend

1

1

1 Mile

三三三

9

(Joins sheet 19) 5000 Feet

(Joins sheet 20)



FULTON COUNTY, KENTUCKY — SHEET NUMBER 10

(Joins sheet 4)

10



(Joins sheet 9)



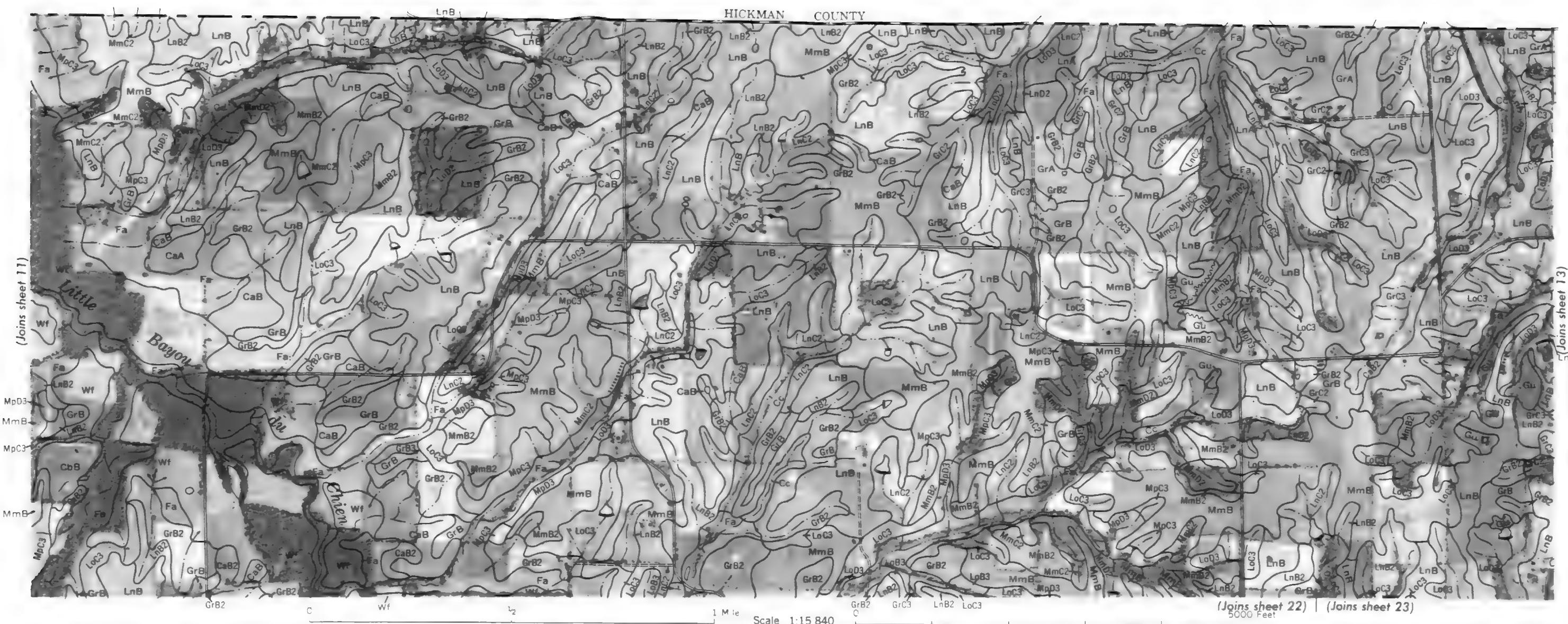
FULTON COUNTY, KENTUCKY — SHEET NUMBER 11

(Joins sheet 5)

11

(Joins sheet 12)



N
↑



FULTON COUNTY, KENTUCKY — SHEET NUMBER 14

14

N

(Joins sheet 6)

MADRID BAR

MISSOURI
NEW MADRID COUNTY

(Joins sheet 25)

RIVER

MISSISSIPPI

KENTUCKY

POND

(Joins sheet 15)

Scale 1:15 840

5000 Feet

FULTON COUNTY, KENTUCKY — SHEET NUMBER 15

15

N
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(8) *sheer*

(Joins inset, sheet 6)

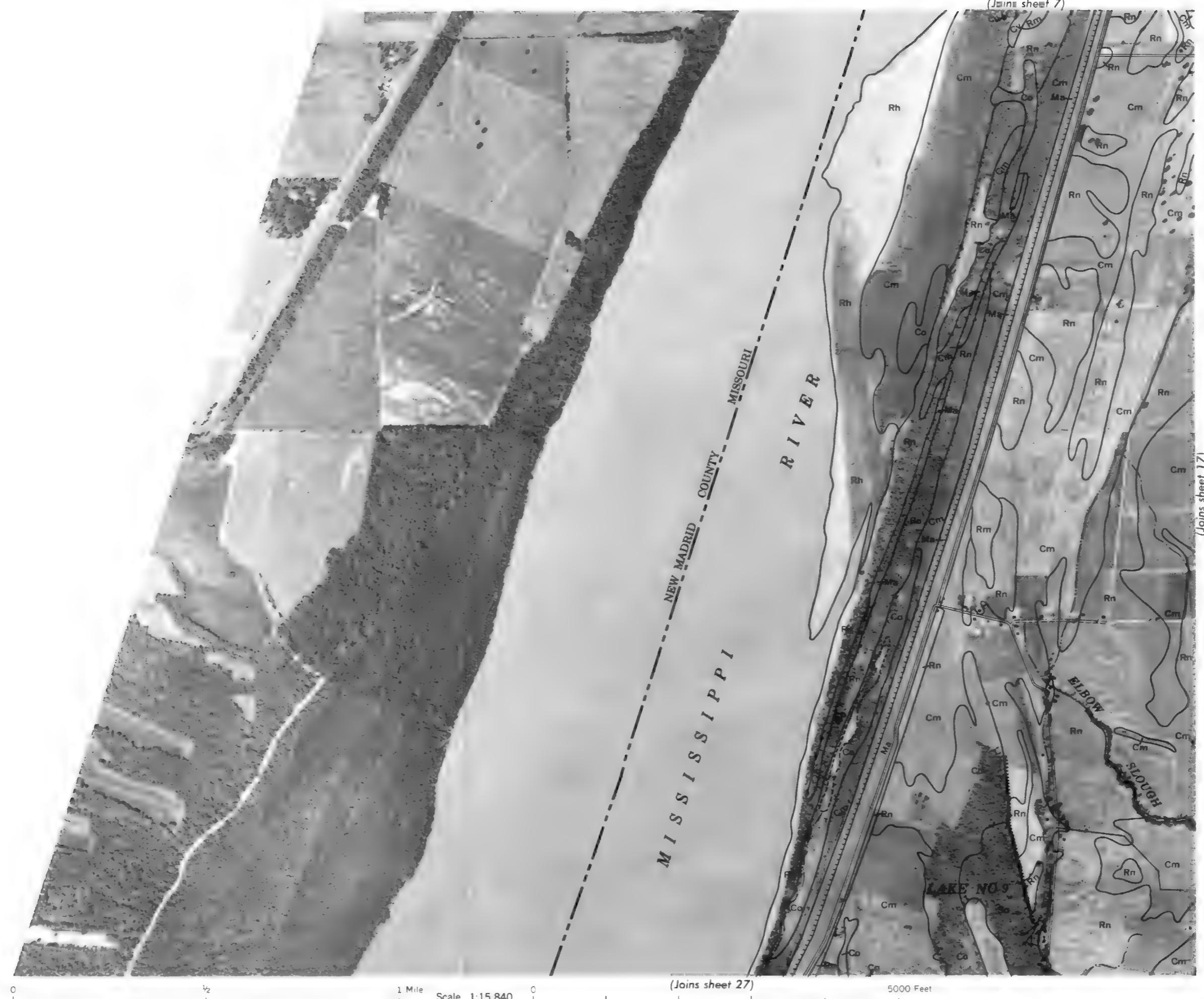
Join sheet 14



16

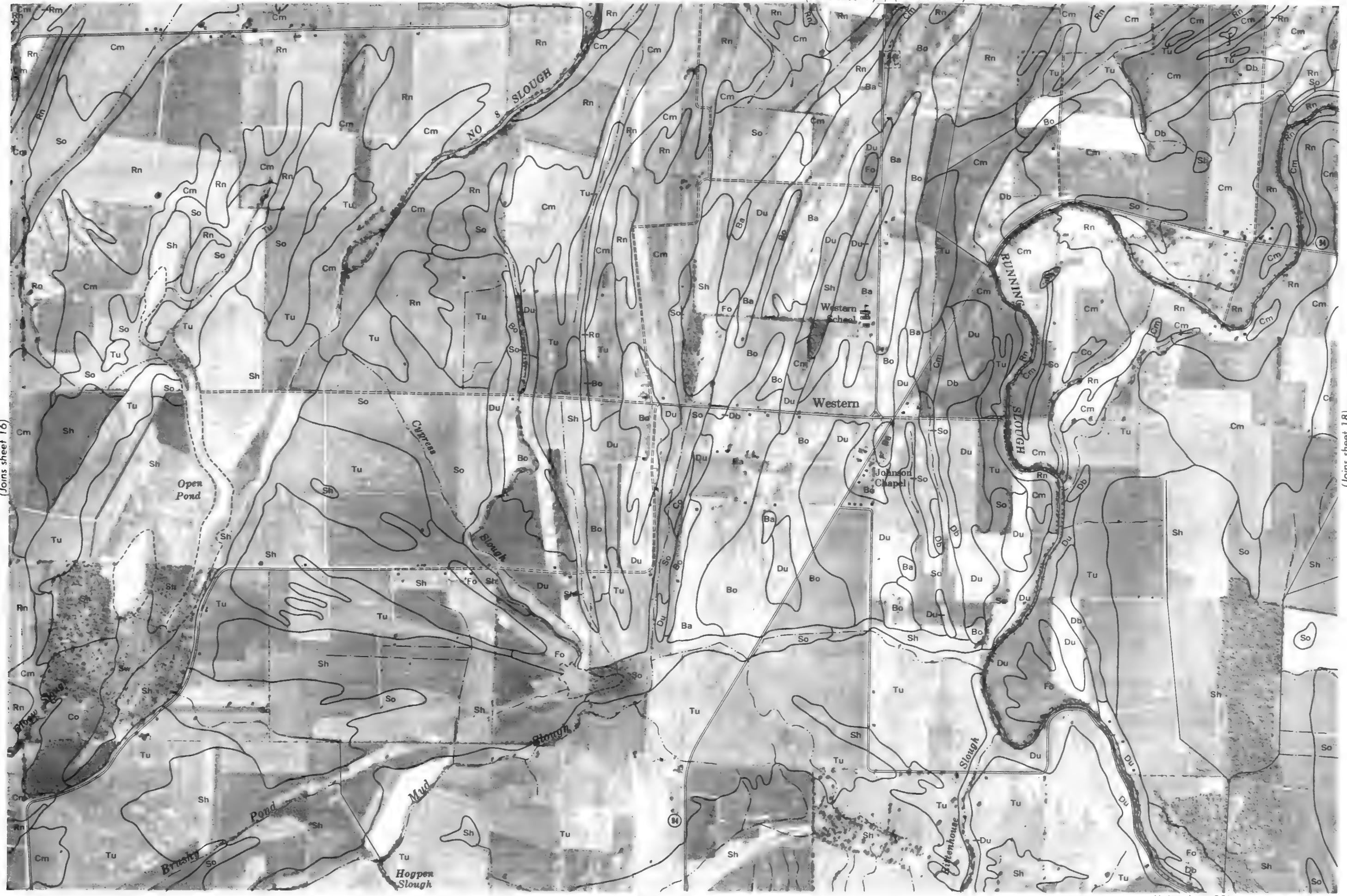
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(Joins sheet 15)



FULTON COUNTY, KENTUCKY — SHEET NUMBER 17
(Joins sheet 7) | (Joins sheet 8)

17



FULTON COUNTY, KENTUCKY — SHEET NUMBER 18

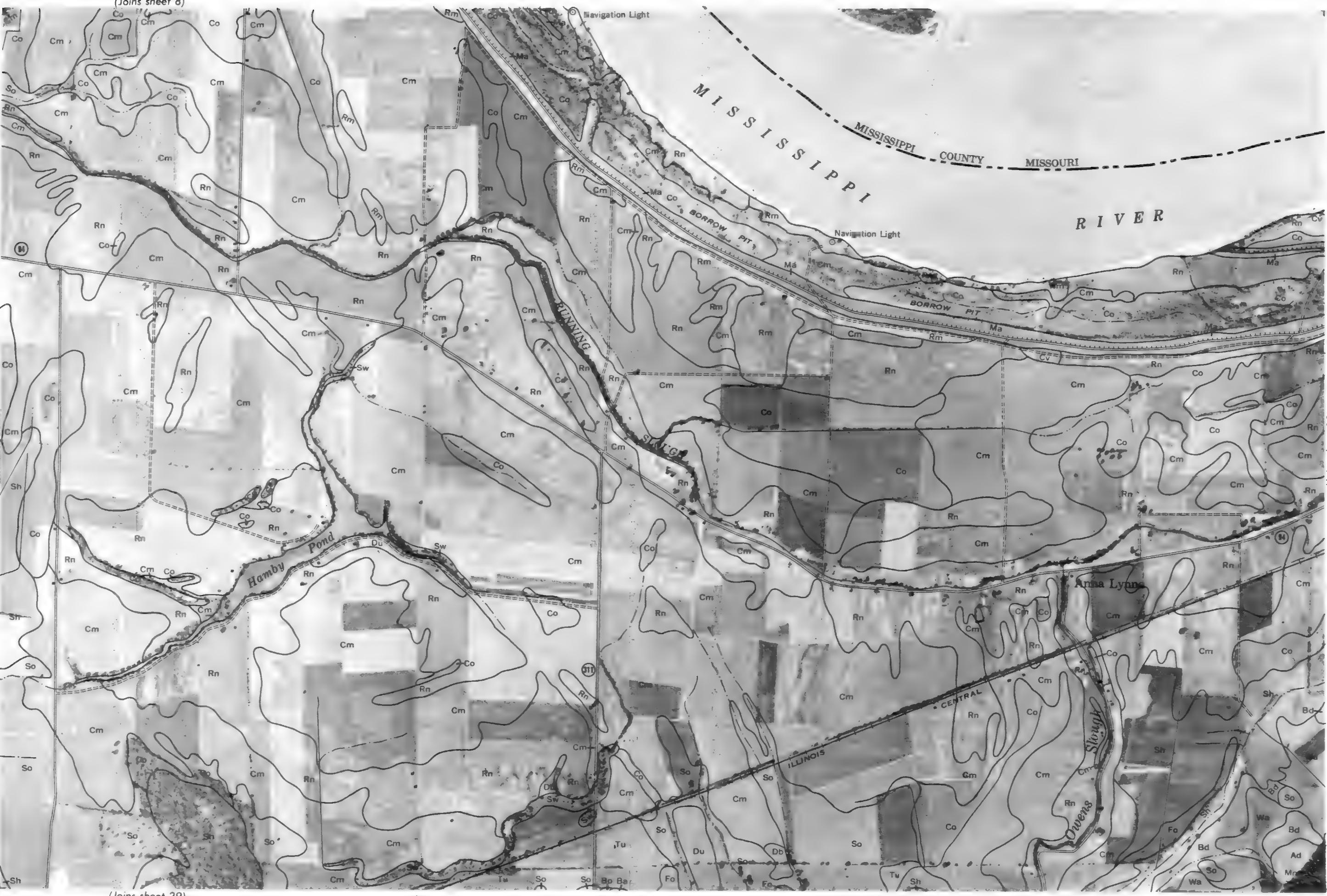
18

N

(Joins sheet 17)

(Joins sheet 29)

(Joins sheet 8)



Scale 1:15 840

5000 Feet

FULTON COUNTY, KENTUCKY — SHEET NUMBER 19

(Joins sheet 9)

19

MISSISSIPPI COUNTY

MISSOURI

RIVER

M I S S I S S I P P I

(Join sheet 18)

Running

Sloane

CENTRAL

6

Wa

1 Mile

Scale 1:15 840

LUD-ECCC F-4

(Joins sheet 30)

FULTON COUNTY, KENTUCKY - SHEET NUMBER 20

20

(Joins sheet 9) | (Joins sheet 10)



(Joins sheet 19)

LnB

Loc3

(Joins sheet 31)

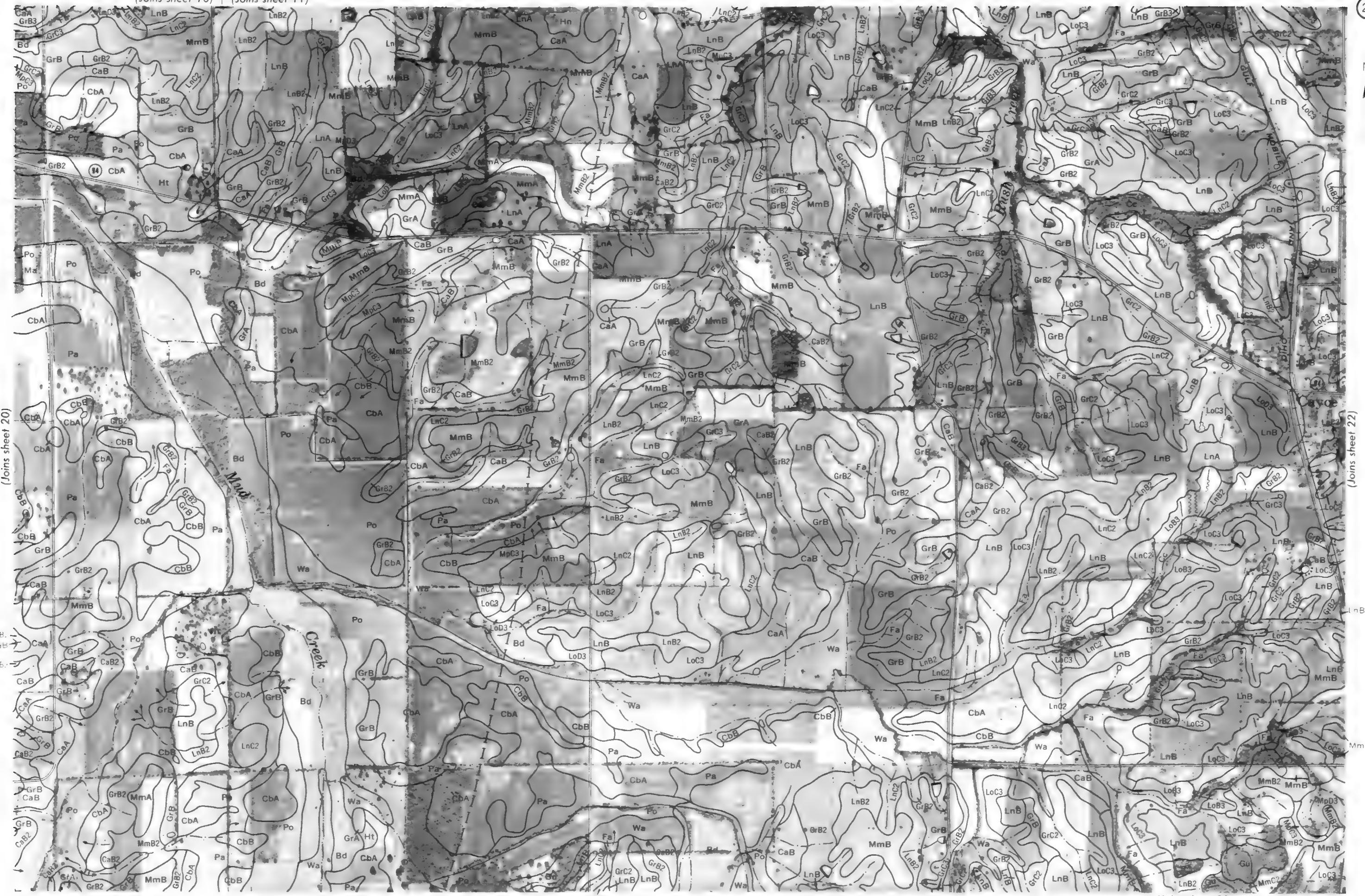


(Joins sheet 21)

FULTON COUNTY, KENTUCKY — SHEET NUMBER 21

(Joins sheet 10) (Joins sheet 11)

21

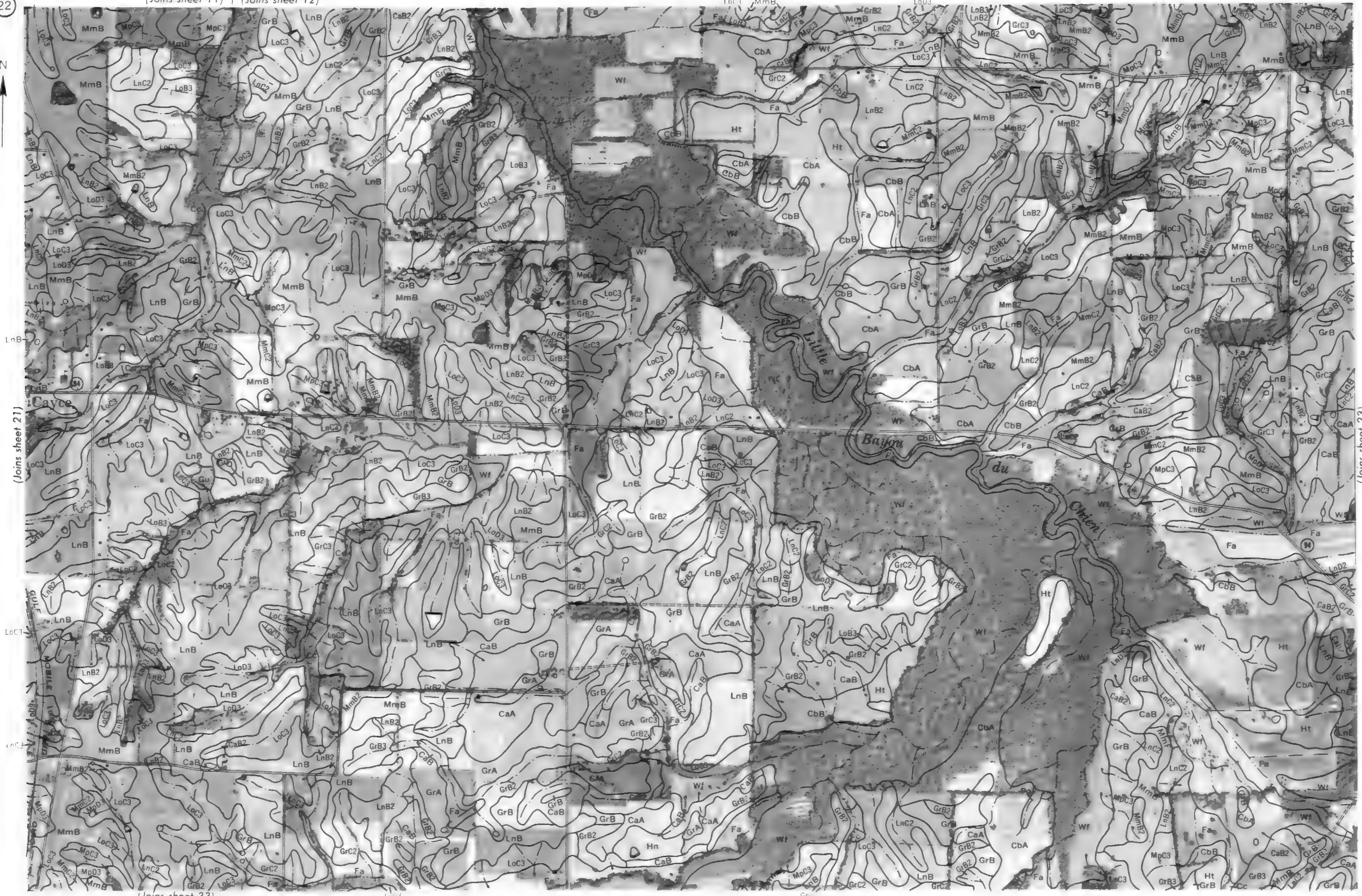


N

Lr

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Join sheet 23)



FULTON COUNTY, KENTUCKY — SHEET NUMBER 23

(sheet 12) | (sheet 13)

Q1

1

(Joints sheet 24)

(Joins sheet 34)

Scale 1:15 840

5000 Feet

FULTON COUNTY, KENTUCKY — SHEET NUMBER 24

24

2

MmB

LnB2

(Joins sheet 23)

GrB

MpC3

GrB2

LhB

GrB (Joins sheet 35)

(Joins sheet 13) GrB2

Cc

HICKMAN COUNTY

M

e

Scale 1:15 840

5000 Feet

(Join sheet 25)

N



(Joins sheet 16)

27

(Joins sheet 26)

MISSISSIPPI
NEW MADRID COUNTY
LAKE COUNTY

LAKE COUNTY

TENNESSEE

RIVER

LAKE

5000 Feet

Scale 1:15 840

C

(Joins sheet 28)

28



(Joins sheet 17)

28

N



Scale 1:15 840

FULTON COUNTY, KENTUCKY — SHEET NUMBER 29

(Joins sheet 18)

29

N
↑

(Joins sheet 28)



(Joins sheet 30)

FULTON COUNTY, KENTUCKY - SHEET NUMBER 30

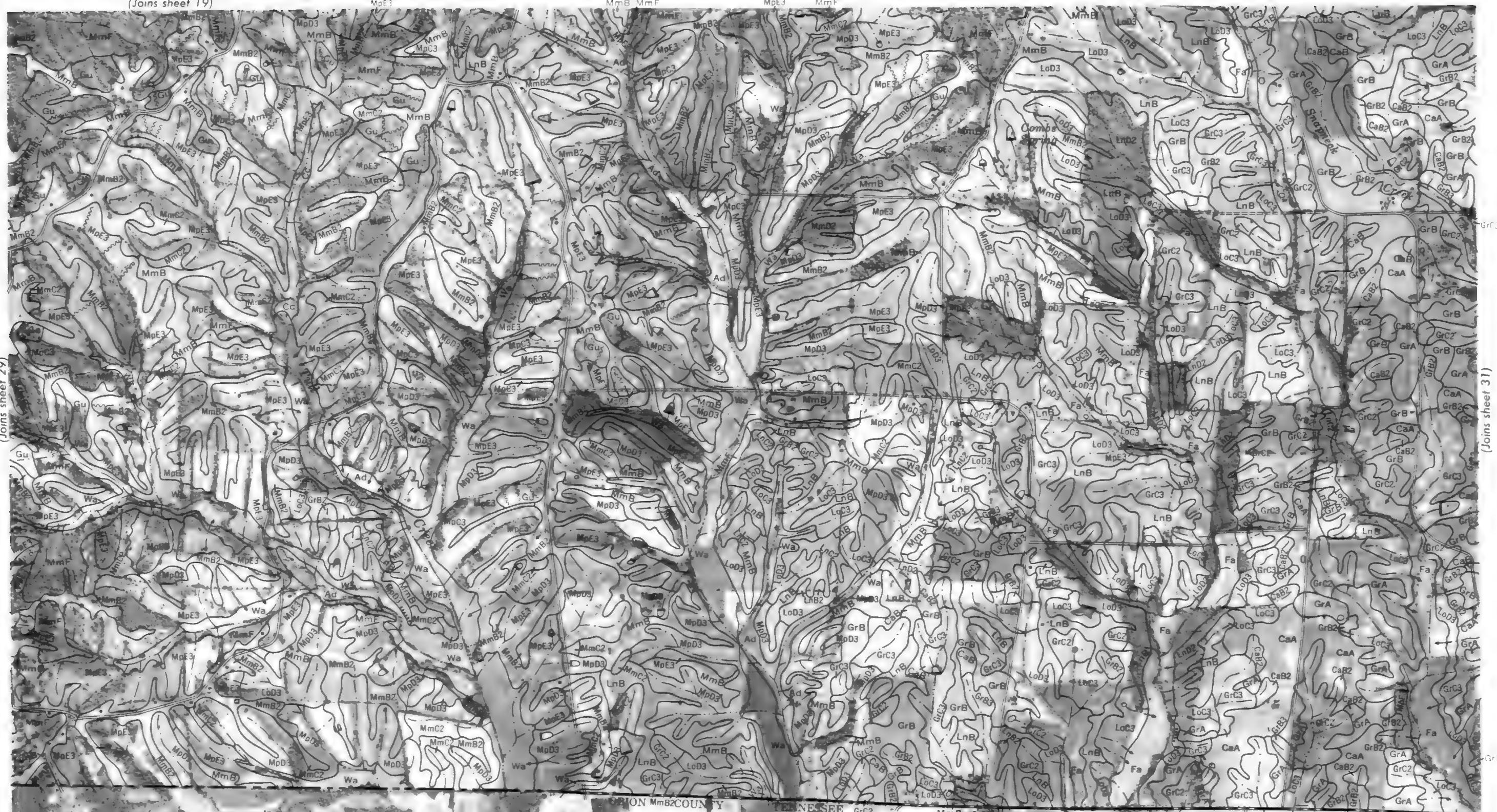
(Joins sheet 19)

30

3

(Joins sheet 29)

(Joins sheet 31)



Scale 1:15 840

00 Feet

FULTON COUNTY, KENTUCKY — SHEET NUMBER 31

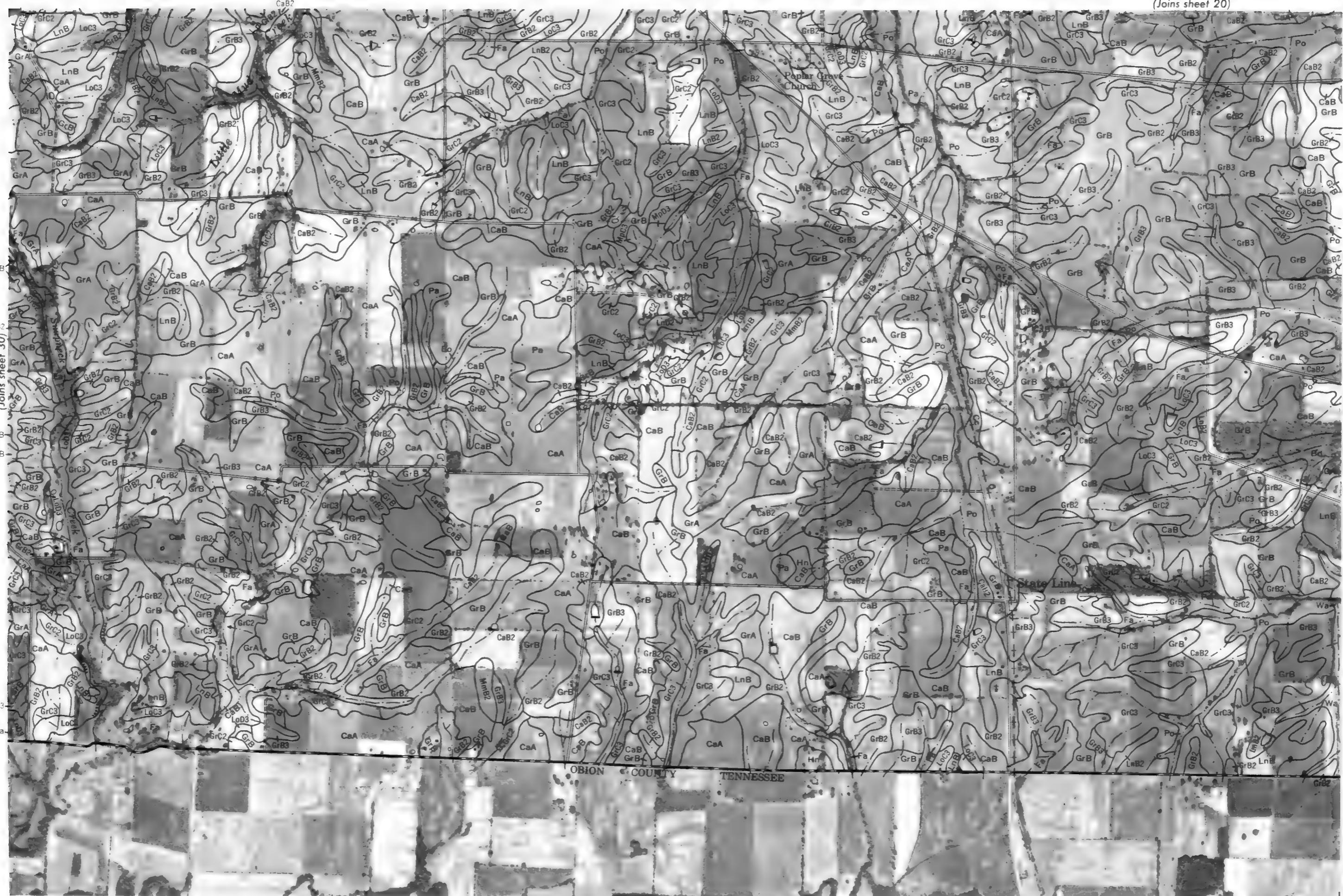
(Joins sheet 20)

3

(Join sheet 32)

(Joints sheet 30)

3



FULTON COUNTY, KENTUCKY — SHEET NUMBER 32

32

N

(Joins sheet 31)

(Joins sheet 21) Pa

Loc3



Scale 1:15 840

1 Mile

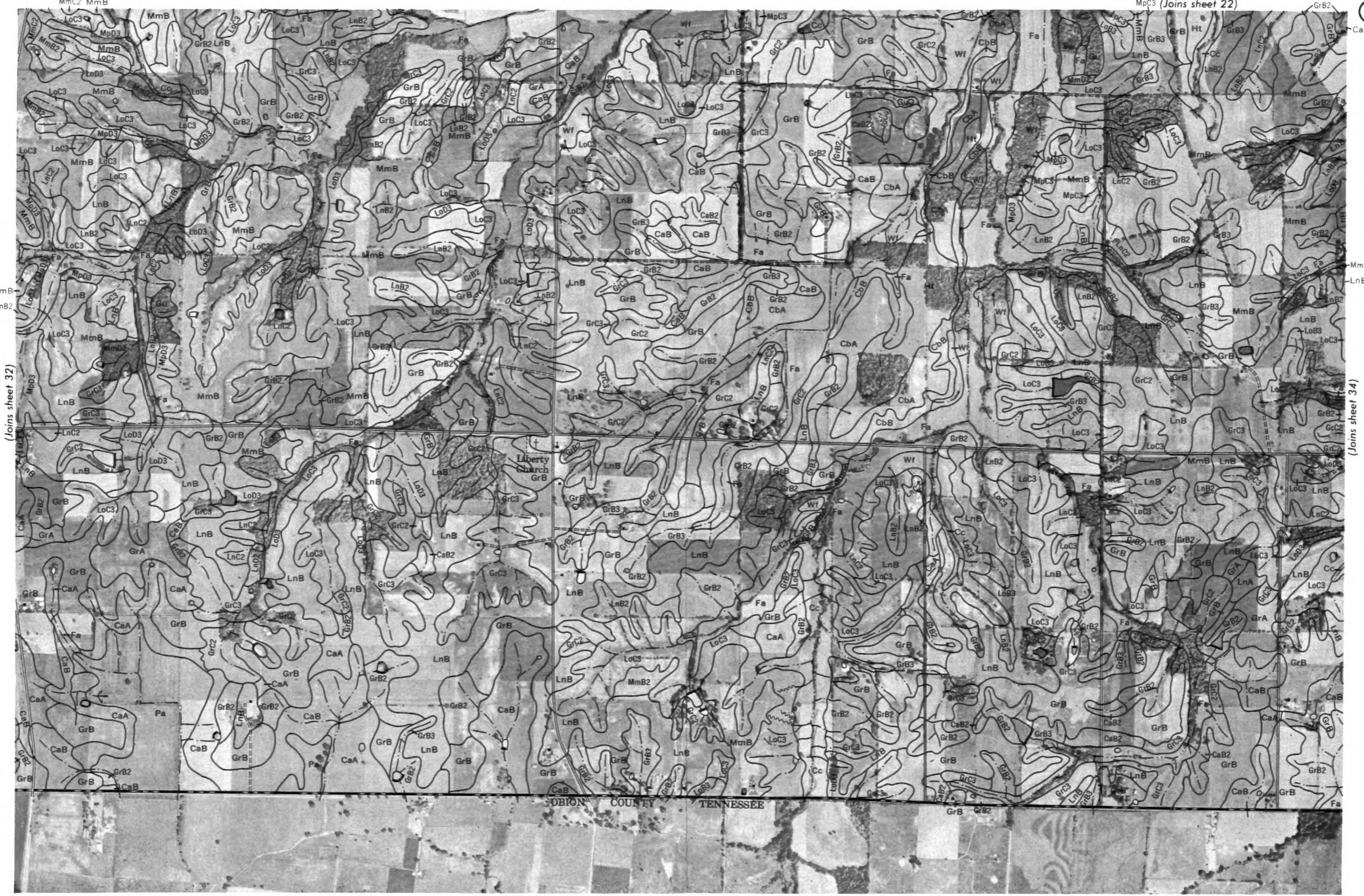
5000 Feet

(Joins sheet 33)

FULTON COUNTY, KENTUCKY — SHEET NUMBER 33

MpC3 (Joins sheet 22)

33



FULTON COUNTY, KENTUCKY — SHEET NUMBER 34

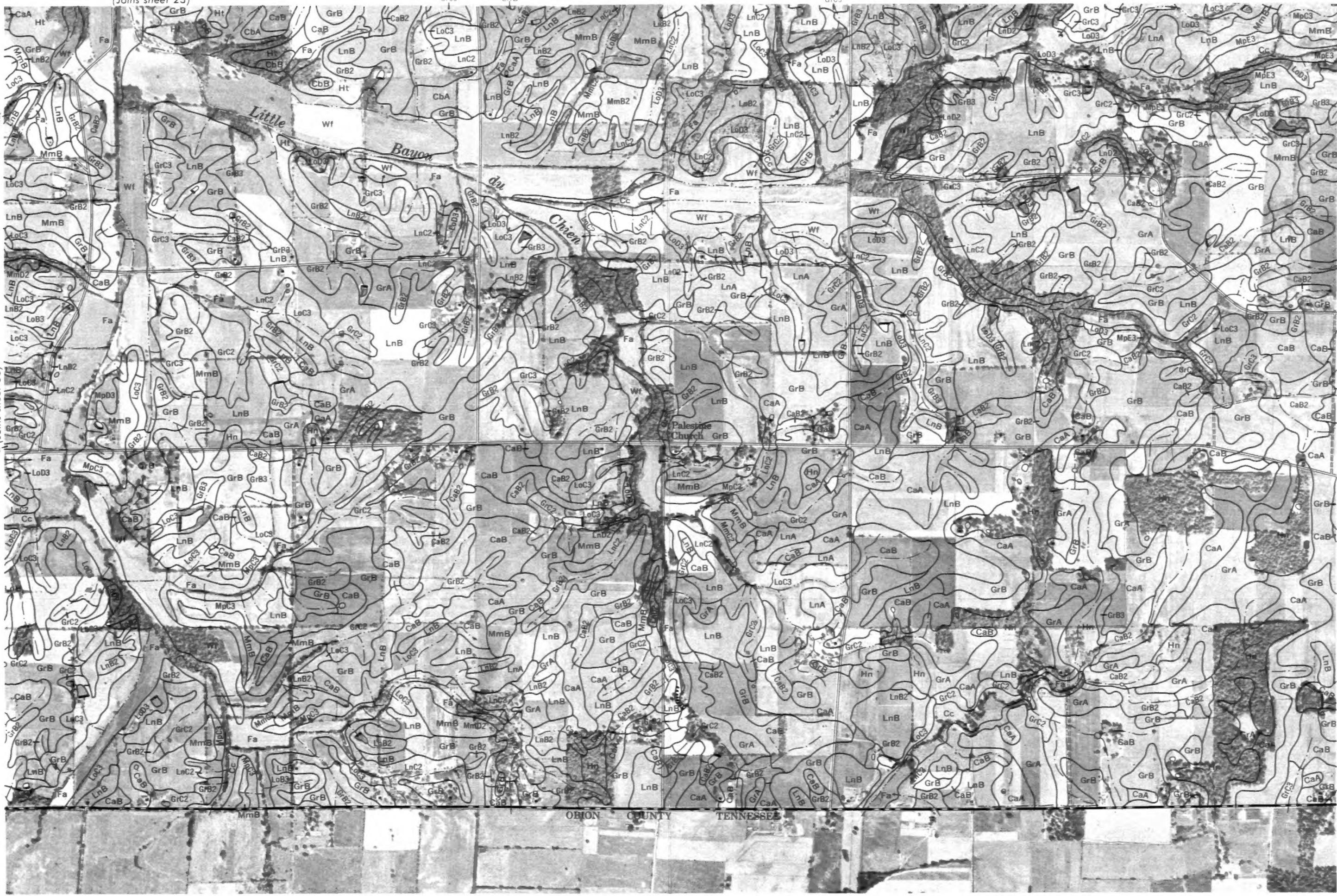
34

(Joins sheet 23)

N

(Joins sheet 33)

(Joins sheet 35)



1 Mile

Scale 1:15 840

5000 Feet

FULTON COUNTY, KENTUCKY - SHEET NUMBER :

35

(Joins sheet 34)

(Joins sheet 24)

